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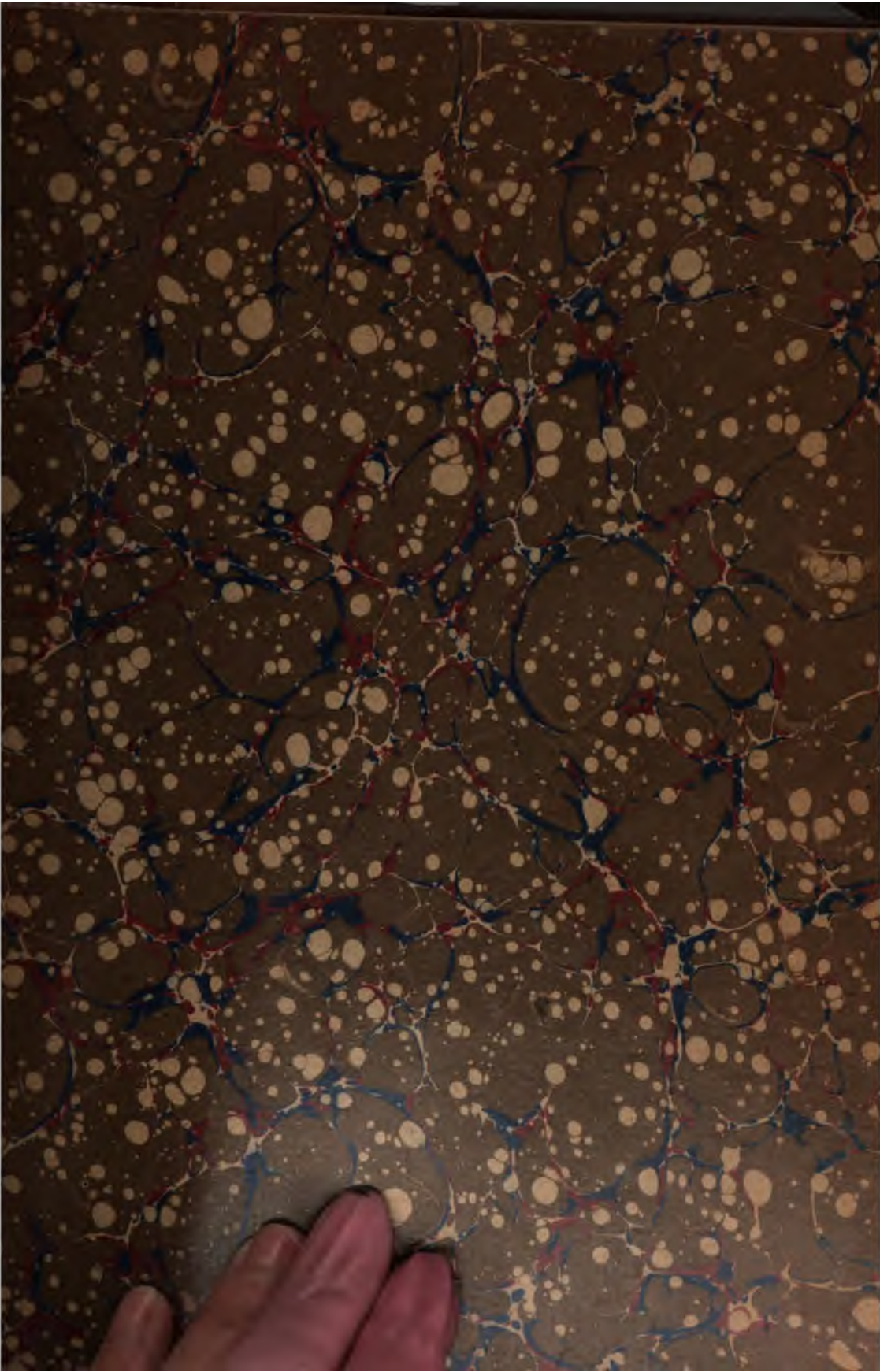




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The JOURNAL *of* GEOGRAPHY

An illustrated monthly magazine devoted to the interests of
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Secondary and Normal Schools

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RICHARD ELWOOD DODGE

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RICHARD ELWOOD DODGE

Professor of Geography, Teachers College, New York City

Associate Editors

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THE JOURNAL OF GEOGRAPHY

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NO. 1

GEOGRAPHICAL CHANGEABLENESS. SOME CHARACTERISTICS AND VALUES.¹

BY ROBERT MARSHALL BROWN

State Normal School, Worcester, Massachusetts

THIS Journal has published during the past year many articles² which discuss, and offer suggestions along the line of what a child should know as the result of a primary and grammar school training in geography. The authors have furnished us with helpful summaries. In a discussion of any plan of this nature, three factors must be recognized. These are the child, the course of study and the teacher. The writers have eliminated the real child by assuming a normal pupil. Consequently their plans for improvement are concentrated on the course of study and the teacher. Courses of study do not as a rule limit a teacher's power or harass her individuality. And, after all, the outline is only the safeguard, the thing that keeps the teachers on the track and running in the same direction. In the last analysis, it is the teacher's partiality towards special parts of the subject and her more intimate knowledge of one topic than of another, that determines the weight of the instruction. Apart from the stress of impending examinations which her pupils have to face, when courses are paced for immediate results and not for lasting ones, the teacher is a free agent.

In this discussion, three correlative propositions are to be kept in mind; that some things cannot be taught young children; that many things are better not taught them; and that, owing to their limitations (undeveloped minds) and to the teacher's limitations of time, some phases of the subject matter must be imperfectly or erroneously understood. The bounds of our subject may be stated inclusively, as was the plan of the writers in the April Journal. It may be stated exclusively, by defining contiguous subjects and

¹An address delivered before the Worcester County, Mass., Teachers' Association and rearranged for publication in this Journal.

²See especially, *Journal of Geography* IV, 4, April, 1905.

considerations which have been declared unnecessary in the development of the child's mental state. A selection of subject matter, if it is the result of deliberation, implies that many things have been considered and a few chosen. The items discarded must have been rejected for a reason. A teacher who follows a course of study in geography and does not know why the outline was so constructed nor the cause of the many seeming omissions is not working in the light. There is as much difference between the spirit and the letter of a school course as between the spirit and the letter in the Mosaic decalog. "Thou shalt not" plus conscience or reason developed into "thou shalt." A course of study, balanced and proper, arranged for any single grade, cannot be adequately followed by one ignorant of the considerations on which the judgments were based. Many of the items that appear in the outline may often disclose their worth through an understanding of numerous quasi-important items.

The question as to what a child should know does not seem to be answered by listing certain precepts and relationships and conditions. There is more to geography than can be compassed in such a census. If the writers assumed not only a normal child but also a capable teacher the weight of the discussion might then fall upon the outline. Our paidology is fast providing plans for the deficient children and steps are being taken to provide special accommodations of mind and time for them. We may then eliminate the child from the discussion on the assumption stated above. It is inevitable that the light of approaching days should bring out new relations in the subject matter of geography. In this increasingly better view we are hopeful that a constant improvement in outlines will always be in vogue. As this knowledge comes to the teachers, if it is knowledge and conviction based upon a broad outlook, a social and a reasoning world demands that it be presented to them not in the shape of commands to be obeyed, but as an issue to be weighed. With this rapid dismissal of two of our factors, let us turn our attention to the teacher, the third factor in the discussion. I have already inferred that the interpretations of an outline may have a wide range according to the inclination of the teacher or the interest incited in her by certain topics. It has been the case in times past that teachers of limited knowledge, maintaining views that are not accepted to-day, have nevertheless been teachers in the larger sense. They impressed their personality upon their pupils and were broader and better than the things they taught. Here and there, such teachers are extant. We call them of the old school. However, it is not a safe policy for the teachers of to-day to trust too implicitly in their own personality or to allow their knowledge to wane into eccentric conviction. Nor is it a wise decision for a teacher to

decide once for all on the line of her effort. It is better for the teacher to acknowledge the changeableness of geography and as new theories, new facts, new methods and new considerations arise, to be in such a rational mood as to absorb gradually and easily the things that are of value. It is better to grow into the new ideas by constant modifications, than by clinging to the old, to find later that our knowledge is discountenanced, that it must be discarded to a large degree and something altogether strange must be adopted. Under the last supposition, it seems almost useless to learn at all. I have heard teachers voice this sentiment in the face of new discoveries and new theories.

Let us turn in another direction. We are told to-day that the period of infancy which in man is longer than in animals is of vast significance, "and a man's characteristics at various ages are more largely due to modifications produced by his own and less to race experience than is the case with any other animal."¹ And all this in order that he may adapt himself to his condition in life or that he may enjoy a plasticity of physical and mental being, whereby changing methods in life and varying lines of philosophy and science may be realized by him. If this is so, then one of the aims of education should be to develop a faculty of adaptation that will give a new idea a welcome and an opportunity of eliciting a reasonable response. To learn and to be able to locate the cities of the earth is a task which the athletic memory of a child easily overcomes. This knowledge may be retained because of what we call a good memory or because the mental process becomes habitual by means of repetition or drill. Soon, however, such knowledge may lose its value. Some unessential feature, as the rhythm or rhyme or even the inflection, is often the basis of this special act of memory; like a tune which is not easily taken up at a subordinate measure but which once begun is often carried to a successful conclusion. Thus the knowledge becomes a memory chain, a pathway of narrow width, and all the data therein become encased in a setting. The independent facts cannot be readily used, apart from their associate ideas. And what is worse, if there comes a time when a shifting of the values occurs, and such a memory scheme is relied upon, there is no provision in this method to meet such a condition of affairs. These are some of the steps that lead us to believe that our geography teaching should be something more than an exercise in memory and a drill. Apart from that value in the study of geography which adds to the sum of human happiness through the channels of general intelligence, I should place the greatest weight on the training that comes from classifying and cataloging in one's mind the panoramic scenes of the earth as the years unroll the canvas.

¹Fitzpatrick. *Fundamentals of Child Study*, p. 6.

Geography has suffered and is suffering still from an ossifying of many parts that should remain supple. Stories are told, illustrations are used, theories advanced and conclusions inferred with a precision and a constancy that is disastrous, first to the teacher and finally to succeeding grades of pupils. The teacher's part in this changing geography lies in such a desire to freshen her foundations that a constant achievement results. The time that is spent in studying and memorizing certain unessentials could be more profitably spent in this direction. There is enough in literature that is valuable to satisfy the demands of memory training, and the accession is a greater addition to one's education than the variable facts of geography. With volumes of statistics published yearly, we can now ease our memories by carrying, if we judge such items indispensable, a small volume of geographic information in the vest pocket.

It may be useful to teachers to know what pupils have learned and are learning. The process here is to compare the recent past with the present. In a subject growing with rapidity there may be greater error in such a proceeding than in a subject of slower and more stable growth. It is, however, possible to obtain results with a degree of accuracy where neither the teacher's method nor the outline has been altered beyond an accountable quantity. If the graduates of the schools are in unison in regard to certain precepts, if the same illustrations are used in explaining principles of wind movement or the government of states, if the same trite expressions come naturally to many lips in defining, and if the same erroneous conclusions are drawn from given specific causes, it is reasonable to believe that the sources of information—books, or teacher or teacher's teacher—have been the same. We must always have in view that the pupils of teachers become the teachers of pupils of the third generation. If the process of teaching is merely that of transmission there is danger of falling behind. I am not in a pessimistic mood. I do not believe that the teachers teach what was taught them, following the method of presentation and the manners in general of former preceptors. While I do not believe that such things are done in general, I am forced to believe that in specific parts of a subject this manner of teaching is operative. These parts are diminishing in number; some of them however will only die with the generations. In view of many items now suffering from what may be termed the momentum of the favor of past teachers, I desire the teacher of the present carefully to scrutinize her foundations.

One of the tests of the great art in a teacher, one of the marks of genius, is the balance of any presentation. It is no easy task to present a story to a child mind and have the emphasis on the right part. It is a common ex-

perience that a minor detail often catches the child's attention and becomes the pivot of the story. In a class of children it is almost axiomatic that some minds will stray away and make for themselves a new emphasis based on some previous conception. In the apperceptive process the teacher may give the new experience, but in its adjustment with the old in the child's mind, she is responsible only so far as the pre-existing ideas are the results of her work during the previous weeks and months. As the child advances in the grades, the teacher's power and part in the apperceptive process becomes more marked because of the increase in the number of ideas emanating from her. "And it may well solemnize a teacher, and confirm in him a healthy sense of the importance of his mission, to feel how exclusively dependent upon his present ministrations in the way of imparting conceptions the pupil's future life is probably bound to be."¹

I have carried on, rather surreptitiously, for a number of years an investigation of certain ideas in the minds of the products of our schools, teachers and otherwise, and I feel that there is need of some investigation by teachers in general along the line of their commonplace stock in trade. There is danger as the years go by in a teacher's experience, unless she strives at all hazards to overcome it, that her expressions and teachings become petrified, not in all lines, not even in one line perhaps, but in a few subordinate particulars. Therefore I urge that year by year a few of our general precepts and laws as they have been conceived and as they have been voiced, be subjected to a rigorous overhauling.

Following are a few examples of what I have in mind; they are along the line of a misdirected use of the superlative and a tendency towards superficial and not thoughtful deduction.

There is, I feel, in the minds of many graduates of our schools a too extravagant notion in regard to climates. As the various states and nations are studied, the idea conveyed in the use of the term "hot climate" is unduly exaggerated. Among many older persons there is almost a dread of traveling lest other climates be less salubrious than their own. I have seen teachers who vibrated in so sympathetic a strain with their teaching that when a "hot climate" was described, they showed evident signs of discomfort in their expression, and I can almost believe that they were in some danger of a sunstroke. The word "hot" in the apperceptive process in the child may mean the stove she or he so unguardedly touched. It seems almost impossible not to overstep the bounds and yield a notion of excessive discomfort and danger, at all times and in all places, in what is termed the hot belt in the beginnings of our teaching, but a more tempered notion should be

¹James. *Talks on Psychology and Life's Ideals*, p. 168.

gained before the child leaves the grammar school. It may be only paucity of vocabulary that makes a child of ten say that the climate of Bombay is so hot that the inhabitants have to live elsewhere. In the process of time the pupils should discover that heat is not the worst feature of tropical countries, and more often than we are inclined to believe the heat is not unbearable. The zonal classification of the earth into heat belts on which we are apt to base our knowledge of climates is in some degree responsible for the misapprehension. These things we know; that the latitudinal division of the earth into zones is based on light and not on heat; that other factors influence the temperature besides distance from the equator; that the expression "torrid zone" is not in good repute with a large class of teachers; and that the term "hot belt" cannot be applied simply, inclusively and carelessly to sub-equatorial and tropical domains.

To classify places as healthful and unhealthful is not always judicious. Conditions which tend towards the spread of diseases may be of geographical importance or they may not be. The story is one of larger import. Mankind may rise above most factors on the earth but he can scarcely hope to be greater than climate. Like the vegetation he is limited in his range. The races have their zones of best development, and deterioration and sparsity characterize them as they spread toward the warmer and cooler, or wetter and drier states. Men will doubtless ever go to all parts of the earth to live and will perhaps rear families there, but races probably will not. All else in the story of healthfulness is embraced in very special and sometimes minute conditions; conditions often within the power of man to control. Apart then from the race adaptation, the story of Benares or of Nigeria is only the story of Washington, or of New Orleans.

Another illustration may be found in the Gulf Stream. This oceanic stream and the oceanic drifts are working overtime. Maps are published black with arrows which show the direction of these drifts, and one becomes dizzy, almost, as he beholds the apparent vortexes. By nearly every teacher and pupil who has come within my range of knowing there is held an exaggerated idea concerning the Gulf Stream. I have asked teachers and pupils to estimate for me the time that they think it takes for the so-called Gulf Stream to pass from Hatteras to the British Islands. The results are as follows: two weeks is the answer of the majority, and the maximum and minimum averages respectively two months and one week. One of the classic examples in algebra reads, "A boatman rows 20 miles down a stream and back in 8 hours. He finds that he can row 5 miles down the stream in the same time that he can row 3 miles up the stream. Find the time he was rowing down and up respectively." Under the heading "Fastest Atlantic

Ocean Passages" in the World's Almanac for 1905 are chronicled nineteen record trips ranging from 5 days 7 hours 23 minutes to 8 days 22 hours 13 minutes. Of these nineteen, eight are from transatlantic ports to American ports. The best record is by the steamer *Lucania* of the Cunard Line from Queenstown to New York in 5 days 7 hours 23 minutes and the second best record is accredited to the same steamer running from New York to Queenstown in 5 days 8 hours 38 minutes. In other words there does not seem to be a severe hindrance offered to transatlantic steamers in sailing against this over-rated stream. What may be gleaned from these records in the way of difference can be accounted for by the prevailing winds. If we apply the algebraic problem to the steamship records, neither of which I am upholding as an absolute verity, there must come over a thoughtful person some wonder at the great discrepancy between the figures and the popular notion. Teachers and others look for the Gulf Stream when they voyage as tourists to other shores, and by means of their faith and their imagination they see the dark green color that betokens an oceanic river. All sorts of changes and conditions are accredited to this drift and to similar drifts in other seas. The influence of this so-called stream upon European living is a common exaggeration. Redway writes, "In this respect (as modifiers of climates) their (oceanic drifts) effects are inconsiderable, and Western Europe could worry along very well without the Gulf Stream, so far as temperature is concerned."¹ Gannett cites² the Gulf Stream idea as one of the persistent errors in geography. A teacher taught that "The cause of our cooler summers is the eruption of Mt. Pelée which turned the Gulf Stream from its course." Whatever else we may believe concerning this last quotation, we must admit that it contains some weight of evidence towards the acceptance, as true, of three not proven doctrines; the theory of changing seasons, one of the superstitions of the race; the relative value of eruptive disturbances; and the Gulf Stream mania. A study of the charts of the Oceans published by the Hydrographic Office of the Navy Bureau may yield some interesting information.

The customs, observances and the like of people distant in place and in habits of mind may be treated more profitably than is often the case. If the aim in studying other lands than our own is self-glorification then many teachers are doing good work. A study of other peoples, to be fruitful, must awaken in the student a sympathy and a feeling of neighborliness. The ties between nations must be made stronger, not severed. To uphold the customs of the Chinese as curious because they are unlike our own, defeats the broader view. The antithesis is unworthily used. Customs are the

¹*The New Basis of Geography*. p. 129.

²*Journal of Geography* 1, 4, 1902, 155.

process of generations and the point of view should always be that of the actor. To an outsider many of our own actions must appear incomprehensible. "Women when going into the drawing room of the Queen Victoria regard a bare skin as a mark of respect." Thus writes a Chinese traveler. "A European skipping match (meaning the dance) is a strange sight." Such stories as the Seven Little Sisters induce a healthy attitude towards our neighbors on this earth. It is a distinct step in the other direction that geographical readers for later grades have chapters on "Curious Customs." I would not denounce the Chinese women nor marvel at her barbarities for bandaging her feet as long as our own women constrict their waists; with the Psyche knot and the rat we do not have to go to Africa to see headdress to talk about; we are not so far from earrings to turn our shafts towards nose rings and the like; and the petty subdivisions into castes and orders, which in many instances have a basis of faith abroad, have not even that saving virtue at home. In other words it is better for the pupils both from an ethical and a material standpoint, to find things to criticise in themselves in a hope of improvement, and to seek for things to enjoy, without arrogance or conceit, in their neighbors. In Stoddard's Lectures¹ we read:

"A Chinese youth, after eating for the first time a European dinner, wrote of his experience: 'Dishes of half-raw meat were served, which pieces were cut with sword-like instruments and placed before the guests. Finally came a green and white substance, the smell of which was overpowering. This, I was informed, was a compound of sour milk, baked in the sun, under whose influence it remains until it becomes filled with insects; yet the greener and livelier it is, the greater the relish with which it is eaten. This is called CHESZE.'"

The time is ripe for saner teaching in this direction. We claim our civilization as the acme. The Chinese say that centuries ago they did great deeds and carried to completion extensive engineering plans, and that they are the heirs of the ages. Is it a case of the mote that is in our brother's eye and the beam that is in our own? Race questions are delicate matters today. We should not teach race divisions on the earth simply because a chapter in the geographies is so headed. We may take the ground that there are Greeks and Barbarians, or we may hold the opposite theory. At all events there is an opportunity here for such careful consideration as has not been given in any extensive way of the value of this subdivision of our subject.

These are some of the items where broader considerations are possible.

¹John L. Stoddard's Lectures, China, p. 321.

The examples have not been exhausted. Many, if not most, of the material in geographic study is open to further search, in the thing itself, in the manner of presentation, or perhaps in both of these lines. Theories are often based on very rudimentary knowledge. Conclusions may be safely drawn from facts; but the children of theories are inferences. If our geography includes some theories and therefore some inferences, we ought to be able to differentiate between these and the tenets which are true. If the theories change, the inferences from them must be made anew. The old should be erased and a brand new set formulated. As our increasing knowledge exposes new conditions, and hitherto unknown facts become the property of us all, the theories are moulded more and more into their proper shape by the additional array of things known. If we are seekers after the truth, we should not cry out because this changeableness is found in the theories of our creed. It is one of the essentials of mental activity that we keep our minds plastic, ready to grasp and absorb the new that is of worth. In this lies the advantage of the rational geography. We are not rearing mummies or phonographs. I am not asking, moreover, the teachers to run after unknown gods nor do I care to have them carried about by divers and strange doctrines. I do urge them to emancipate themselves from superstitions. It has been said that savage races, by an excessive and vehement fancy, are continually and irresistibly led away from the path of science into the wilderness of superstition. We are not so many generations away from our pristine state that the tendency has been eradicated. I do not wish to impose additional burdens upon the teachers, but it is not unfair to ask that an investigation of some of the basal notions of geography be undertaken at certain rather infrequent periods, and the light which has been shed upon them since last they were placed in the glare of careful scrutiny, may expose defects which are to be avoided and yield new truths by means of which a larger outlook may be gained. This changing view is an expectable quality. If we aspire to greater heights, we must be prepared for a broader horizon.

There is often an endeavor in teachers to explain everything. In a superficial way it is supposed to be her business. Not to know seems a refutation of her position. Some attempts at explanation have led to grievous errors. There are many things in geography that are not yet definitely known. These things arise in our everyday lessons. To avoid their problems is to lose an admirable feature of geographic training; to fix their present status in the mind of a child as an unchanging verity, is a policy that caters to the present limited scope rather than to the possibilities of future vision. If we are, as we say we are, training for the future, what is to be is of more value than its present undeveloped entity. Teachers,

however, are not prophets. They cannot know what the future will unfold. But if they know that progress dictates, they must feel that some, if not most, of the considerations that they are now presenting will probably be viewed in a stronger light by the growing generation before its day is done. They must ever be on the alert to catch the message of change and be watchful of the signs which indicate the path of progress. The idea of change should be one of paramount importance in their teaching. This idea cannot be taught unless it is felt. It cannot be felt unless it is in use. If my reasoning is not at fault, my demand that teachers have a constantly growing knowledge of geographic items is just.

My conclusion reiterates my former statement. If we are in sympathy with the spirit of growth, called evolution—and we should be in this day—there is a value accruing in our study of geography; a value that has not up to this time been accorded its fullest recognition.

THE RELATION OF GEOGRAPHY AND HISTORY

One of the more satisfactory utterances on this subject is found in the report of the history conference to the committee of ten, as follows: "From the beginning the teacher should attempt to connect physical geography with the present political condition of the world, and, in like manner, the study of political geography should constantly bring in the physical features." Even more emphatic is the formal resolution of that conference: "That the study of history should constantly be associated with the study of topography and political geography, and should be supplemented by the study of historical and commercial geography and the drawing of historical maps." Good as this is, we may read between the lines even here the "theater of history" idea rather than the very ground and conditioning element of history. Thorpe, in an essay included in the volume on the Study of History in American Colleges, observes, "That study (history) should be at first chiefly geographical and sociological." He is speaking here of the public school. The College Entrance Examination Board might well go further in its syllabus of history than this: "Geographical knowledge will be tested by requiring the location of places and movements on an outline map." This might have been written a hundred years ago if history had then counted for admission to college.—*From Geography and History in the United States, A. P. Brigham, Report of the Eighth International Geographic Congress.*

THE INDUSTRIAL AND COMMERCIAL IMPORTANCE OF A TROPICAL POSSESSION.

BY GEORGE D. HUBBARD
Ohio State University, Columbus, O.

IT is the purpose of this paper to show how geographic conditions determine what shall be the economic relation between a temperate and a tropical country. All are more or less aware of the great climatic differences between temperate and inter-tropical lands, but few have made any extensive study of other existing geographic differences. A moment's meditation will make it clear that many of our luxuries and some of our necessities are from countries in very low latitudes; and that our industrial, social and economic organizations would each undergo serious alterations, were we obliged to return to the geographic limitations under which we of the mid-latitudes worked only four or five centuries ago. From the warm countries we now import rubber, coffee, fibers, gums, oils, drugs, dyes, starch, sugar, chocolate, cacao and fruits, early vegetables and ornamental woods; also ivory, skins of manatee, dugong, crocodile and monkey, to say nothing of the precious metals annually attracted to our mints and crucibles. Essentially all of these commodities require for their best development one or more of the following—high temperature, with no frost at any season, excessive rainfall and humidity, long ripening season, or are confined to warm seas—conditions which do not obtain outside of the tropics. We also value, perhaps too highly, tropical countries as markets for the ever increasing products of our shops and factories, because, with their lack of labor, skill, and capital almost nothing is made in these lands beyond the immediate requirements of local consumption.

There seem to be four fundamental motives for exploiting and acquiring new lands, (1) desire for luxuries, (2) demand for an increase in the amount or variety of the more substantial raw products, (3) the need of new lands for colonization by surplus population, (4) demand for markets.

Among people of the temperate regions the first motive is a prominent feature in most of their exploitation, especially in tropical countries. In modern times the second motive is usually active and exceedingly potent in the conquest of tropical possessions. The third has proved itself nearly valueless because of the difficulty, in a region very different climatically from the home locality, of effective acclimatization. The fourth motive is very strong in manufacturing countries, but, owing to the few wants of the natives, the value of tropical countries as markets is limited to certain classes of commodities, notably building and construction materials and adapted

machinery. To sum up then there are two distinct inducements for the development of tropical countries, (a) their new, cheaper or enlarged supplies of raw materials for our factories or directly for our tables, (b) their possibilities as markets for certain classes of our manufactured goods. It is to the geographic relations of these two propositions that I desire to turn the reader's attention. For illustration, one tropical region is presented, the French possessions in Further India. This country is one out of several which might well have been selected.

French Indo-China, according to the Statesman's Year Book, 1904, has an area of 250,000 square miles. This is contained in four dependencies, Cambodia, Cochin-China, Annam and Tonkin, with a total population of about 18,000,000, equivalent to 72 persons to every square mile whether it be dense forest, tangled jungle, pestilent marsh, fluctuating lake, rugged mountain or fertile plain,—all of which types of topography are fairly well represented in the country. For comparison, New York State with its area of 47,000 square miles and population of over 7,000,000, has 153 per square mile, approximately half of the total population being in Greater New York. There are no large cities in Indo-China. Two have each about 100,000 inhabitants and only two or three others exceed 20,000. In New York, 20 cities, besides the chief port, have each a population of over 20,000, and an average of over 60,000, leaving for the village and rural population 2,600,000 people. These figures indicate that the density of the rural and village population in French Indo-China is 30 per cent. higher than that of our great agricultural state. If the natives were as efficient as our American laborers, this would mean half as much labor possible per unit as in New York, or practically the same as that of the state outside of the metropolis. But primitive tools, wasteful methods, and a tropical climate so handicap the native that the potential efficiency is considerably less than ours, while the actual is still lower. However, despite all the handicaps, labor is going to waste in each of the dependencies.

Another element in the geographic conditions—climate, as just suggested, is thoroughly tropical as to excessive humidity and uniformity of high temperature. The mean annual temperature ranges from 70°-80° Fahr. throughout the lowlands, while on the mountains it decreases in proportion to the altitude; the mean annual rainfall ranges from 90 inches in the lowlands to 200 inches in the hills, with even higher local records. It is not a healthful climate, but possesses the general enervating effects of humid heat. Because of the decaying organic matter in the filthy, stagnant water, in the oozy, slimy mud of the deltas, and in the soil of the coastal lowlands, added to the miserable native sanitary conditions, there are in the lowlands several malignant diseases, often very destructive.

Fertile soils abound everywhere and may be made very productive, except in marshes or on rugged slopes. Forests, rich in valuable timber, usually predominate in the landscape; grass furnishes splendid pasture; the two great deltas are unsurpassed rice districts and the continuous warmth and copious rainfall make it possible annually to raise two or even three crops of some plants. At present rice is the chief crop and furnishes the staple food. Cotton, coffee, tobacco, indigo, cane-sugar and spices, together with a great variety of tropical fruits, are among the successfully cultivated plants. Cattle do well on the deforested hillsides, and quantities of fish swarm the rivers and shallow seas to the southeast.

Transportation facilities are inadequate. Most of the streams are used by the native dugouts, but owing to shifting sandbars will not float even small modern river craft, to say nothing of ocean vessels. No canals have been built. Only about a thousand miles of railroad exist in the country and there are no wagon roads save the Mandarin's road which parallels the eastern coast for a thousand miles. To transport rice fifty miles by human portage or on donkeys, the two most common methods, along the narrow, forest-girt bridle paths, costs more than to carry it by ocean vessel from the oriental seaport to Marseilles.

Aside from auriferous gravels and quartz veins at Bong Mien, Annam, about 65 miles southeast of Turan, the chief port, the country is practically without the precious metals. Coal is known in two or three places, and by some is said to be abundant, while others deny its occurrence in valuable quantities. No iron is known, except some poor ores in the hills, a long distance from the coal. Several other metalliferous deposits have been reported but nothing is apparently known about them. Hence little reliance can be placed upon their exploitation and development for the first steps in the evolution of an industrial state.

Agriculture comes next; and upon the products of the soil the country must depend for its exports. Consul Covert, of Lyons, in a report some three years ago says: "Students of French colonies advise the extensive culture in Tonkin of tea, tobacco, coffee, silk, indigo, cotton, ramie, oilseeds and flax."

At present rice constitutes about 75 per cent. of the total annual exports, which in 1902 rose to \$37,000,000. Other items on the export list are teak, sappan, lacquer, and other forest products, coffee, cattle and hides from the hills, tobacco, sugar, cotton, jute, pepper, copra and vanilla from the plantations, and fish, trepang and salt from the sea. In 1902 the imports amounted to about \$43,000,000, including large items for railroad and other building materials and machinery, nearly all of which remain in the hands of Europeans and are used primarily to increase the exports.

higher slopes. Pepper, oilseeds and silk have been successfully grown. A number of the above have native wild varieties of real value. Everything in this list but sugar is imported by France, some from Latin America and the United States, some from Egypt and India.

The immense forest crops, now ready to harvest, might be cut and shipped. Many of the woods are very valuable in the western markets, hence lumbering would be a remunerative industry. Forests should, by all means, be conserved by some adequate system of forestry. Several fiber plants other than cotton and jute are known and seem to find the geographic conditions congenial. Spices, always in demand, promise excellent returns.

As these opportunities are dwelt upon, two questions arise, viz., those of labor and of transportation. The former has been dealt with to some extent. It may be said in addition that the natives in different localities know something of the details of the cultivation and preparation for market of several of these plants. The labor supply is sufficient and only needs supervision to render it efficient. A few Europeans are testing it at present by developing plantations, and they say that they experience no trouble in getting all the reliable help desired. It takes patience and careful management but it is remunerative. When the utilization of native labor is once established, the labor question will become simpler with each succeeding generation. The natives learn the new agricultural processes and at the same time learn enough of western ways to prevent their earnings from accumulating to stifle the spirit of work engendered by their growing needs. The native trade at present is largely in the hands of Chinese merchants, a race of good traders.

But before this export of raw materials, made possible by the employment of native labor, attains appreciable dimensions, the transportation problem must be solved. Imported capital in the hands of Europeans, and native labor, must build roads, construct and operate railroads, dredge and equip the rivers and harbors for commercial navigation, build bridges, piers, lighthouses, warehouses and factories. French capital now so largely invested in Russia will do France more service invested here. There are geographic difficulties, however, in the way of all this building and especially in connection with the road and railroad construction which are unappreciated by men of the temperate regions. The climate, with its enervating influence and associated diseases, tells on the men who must be sent out to survey the routes and superintend the work. The excessive rains flood the streams, wash out bridges and destroy roadbeds. Woodwork is rotted by the great humidity and warmth, or riddled by termites, while a large force of section men is necessary to keep the rank vegeta-

migrant, but in the present state of the country the element of the population from the temperate zone will consist of political, industrial and commercial masters. They are coming to control, not to colonize. Moreover the prolific gardens and loaded fruit trees will furnish food for them as well as for the natives, and the warmth of the climate reduces the amount of clothing and of heating appliances needed. Hence though the Europeans have more wants per capita than the natives, yet because of their insignificant numbers, their personal wants in the aggregate are very small.

If neither the natives nor the foreign population are sufficient to create a demand for foreign goods we may safely say that French Indo-China is not a good market for the textiles, shoes, furniture, vehicles, books, ornaments, foods, instruments and art work made by the industries of France. And it further appears that the surest way to make it a good market is to educate the natives through the years to know the uses of some of these goods. Of course moderate quantities of various commodities of French manufacture are needed in the East, but it is asserted that France furnishes only a small part of the imports even of such kinds as are used. England, Japan and the United States supply most of the textiles, general manufactures, kerosene and flour.

The other half of the question remains to be considered. We have seen that the chief agricultural product of the cultivated districts, the lowlands, is rice, and that this cereal furnishes three-fourths of the present exports. The grain is collected in little boats or by human porters and carried to the ports and thence shipped to Hong-Kong, thence to France and to some of the nearby eastern countries. France buys other rice because her rice-growing possessions do not furnish enough. It is also true that the Oriental market for this product is not yet overstocked. Hence an increase in the production may readily increase the export. Expansion of the output may be brought about in several ways; by better and cheaper methods of cultivation and consequent enlarged yield on the present fields, by the addition of new territory to the rice fields in the immediate vicinity or by the extension of its culture to new districts. The latter will involve the overcoming of distance to market by improved transportation facilities. Other crops of marked promise are sugar-cane and coffee, the former on the lowlands, the latter in the hill countries. For both commodities temperate region markets are good, and with proper encouragement, guidance and assistance in the way of mills, transportation facilities and organization of labor, the industries and output may both be greatly expanded. Cotton, indigo and jute are at home on the low hills and higher parts of the plains, while vanilla and tea have considerable possibilities on the

AMERICAN SAMOA

BY VERNON L. KELLOGG
Professor in Stanford University, California

SAMOA is to some people a political problem; to some a place made memorable by the four years' abiding there of Robert Louis Stevenson; and to a few others a group of tropical islands whose geography and natural history need exploring. To most of us it is simply a map name—a geographical fairyland, without remembered capital, principal town or chief exports. But Samoa does have a capital—at least, in a small thatched hut, under the palms of Mulinuu village, a two-thirds naked king sits on a cocoanut-leaf mat and switches flies from his bare shoulders with a fly-flapper. And it has a principal city named Apia, memorable as the place where an impatient hurricane blew its breath on a certain Gordian knot of world politics and made ropy spindrift of it. And lastly it has chief exports, the name of which is that magic word of South Sea tales, copra. Volcanoes make the mountains and gorges and solid land of Samoa; two hundred inches of rain a year and an ardent tropic sun make its wonderful forest and bush and graceful palms; the "coral insect" makes its white shore-line and cruel reefs; while copra makes its enduring smell and is responsible for its civilization. About it all is the abiding presence of the ocean. From every vantage point one sees the blue water meet the blue sky. Ever in one's ears is the low growl of the water beaten back by the guarding reef. In every direction is it ocean-wide away to the world!

To the geographer the Samoan Islands must be studied from two points of view. First from that of the physio-geographer, and second from that of the politico-geographer. To get to the islands to study them it is simply necessary to embark on a Sydney liner (Oceanic S. S. Co.) at San Francisco. and sit tight for two weeks. You can get off at ¹Pago-pago, the port of Tutuila, one of the American islands, and the only harbor of any real consequence in the whole group. When you have reached Pago-pago, indeed when you are a few hours out of it, you have learned something of the physical geography of Samoa and for that matter, of many other Pacific islands. And this is, that not every South Sea island is a low reef or atoll of coral shining white in the sun with a scattering covering of pandanas and cocoanut palms, the whole thing lifting up but a few yards above the tropic blue ocean. Tutuila rises some twenty-five hundred feet, while certain other similarly formed Pacific islets are much higher. All these are simply volcanoes, now mostly dead (one broke out afresh in Samoa a few weeks ago),

¹In pronouncing Samoan names, wherever *g* is written, pronounce it as *ng* in our word *sing*.

with their steep lava flanks covered with a marvel of beautiful tropic "bush." Around each of these old volcanoes, where it rises from the water, the busy coral polyps have built a reef which is fringing, if no subsidence of the island mass has occurred since its uplift, or barrier if there has. This reef is broken where the fresh water streams pour into the sea, for the coral dies in the face of a stream, and the one or even two hundreds of annual inches of



The Coconut Palms along the Ocean Shore.

water that fall on the steep sides of the island make streams that plunge with strong currents into the quiet sea water. Where the encircling reef meets the steady, trade-wind driven, long swells of the ocean, there is ever a mighty commotion; the roar of the surge and the white line of foam is an ever-present part of the islanders' world of sound and sight.

There are four principal islands in the Samoan group, besides six islets. These first belonged to the Samoans, then to Great Britain, Germany and the United States in common, and now are divided between Germany and us, England having received a *quid pro quo* elsewhere for her interest in Samoa. The largest island lies to the west, the others, progressively smaller and, geologically, progressively older, to the eastward. The first is Savaii, forty-five miles long and thirty miles wide, its primitive creating volcanoes



A Samoan Village under the Coconut Palms.



Lake Larruto, in the summit crater of an extinct volcano. (Note the dense tropical vegetation.)

not yet cold, but with their rugged sides already overrun with liana-bound forests, as yet impassable to man. Next comes Upolu, forty miles by fifteen, richest in cocoanuts and in arable land, with its town Apia, the principal one in the islands, and its green mountain Vaea, with the glossy farm of Vailima on its flanks, securely within the Valhalla of literary fame. Apia harbor, calm and safe in ordinary days when the trades blow across the land, changes into a narrow gorge with jagged jaws of coral in the season of the northwest hurricanes. Then great ships are helpless in its tortuous channels, and the sheltering reefs become themselves the sources of the direst danger. It was in 1889, in this harbor, that a terrible hurricane sank the war ships of Germany and America.

Fifty miles beyond Upolu lies Tutuila, twenty miles long, and from two to five miles wide. Sixty miles still farther to the southeast, out in the sea, is Manua, almost circular, ten miles in diameter, and oldest of all the Samoan Islands in geological time, and once most honored in hereditary leadership. Tutuila and Manua are our islands; Savaii and Upolu belong to Germany.

Tutuila is primarily a huge volcanic crater, which has built up the island with the lava it has ejected. This crater of Pago-pago is fringed about with steep walls from 1,000 to 2,500 feet high, almost vertical on the inner edge after the fashion of craters, sloping away on the outside as the lava flows, two points in its rim, the mountains of Matafao and Peoa, much higher than the rest, and with a break half a mile wide on the south, letting in the sea. The harbor of Pago-pago, thus formed within the crater of Peoa, is nearly two miles deep and a mile wide. This size is, however, much reduced by the fringing reef which occupies half the strait at the entrance, and which forms an unbroken rim about the shore within. But with all this, there is room enough, if not for all the navies of the world, for all the ships likely ever to put in to Samoa. The winding entrance shuts out all surf from the south, and the great walls on every other side make the harbor securely landlocked, whatever the hurricane without. It is, in brief, the one good harbor in all the South Seas, and for that reason it is of high value to a great nation with expansive commercial aspirations. In any case, it is now ours, and is likely to remain so, a mere dock and coaling station in the eyes of our American administrators, but to its people, the colony of Tutuila of the United States of America, a position in their eyes far nobler than to be an independent kingdom.

Of arable land Tutuila has practically none: a few wet places are planted to taro, that curious aroid or tropical jack-in-the-pulpit, whose tuber is the substitute for the potato throughout the Pacific Islands, and for all



The Samoan "Bush." Luxuriant tropic vegetation making the inland forests impassable except where trails have been hewn through.

modern predigested foods, which find their prototype in *poi*. Along the sea-shore and on the lower flanks of the mountains is the cocoanut palm, the most graceful tree that grows. The cocoanut furnishes the only article of export from the island, and is, besides, the chief provider of the native's food, drink, clothes, house and house furnishings. The cocoanut product for export bears the name of copra. This is simply the meat of ripe cocoanuts cut out in little strips, and dried in the sun. The oily, shriveled bits are packed into sacks, and sold to the traders who ship them to Hamburg, to San Francisco, or to Sydney. From this copra is expressed the familiar cocoanut or palm oil used in making certain soaps. All the copra from all of Samoa—and by far the major part of it comes from the German island Upolu—amounts to barely half a million dollars' worth a year. And beyond copra the Samoan exports consist chiefly in much hopeful talk about some future cacao (chocolate). Besides cocoanuts, the banana, bread-fruit, papaya, mango, and a few other food trees grow freely, although but little attention is paid to their cultivation. Without effort on the part of any one, there is fruit enough for all. Add to this fruit, fish, chickens, pigs, *beche de mer*, and squid, and the island contributions to the Samoan's bill of fare are practically all named. As *bonnes bouches* fat larvæ of giant wood-boring beetles, or the uncooked insides of fresh sea-urchins, may be added. Once a year, too, in the full moon of November the strange sea-worm Palolo rises from the depths to spawn, and to furnish the natives with their daintiest tid-bit. An acquired taste for canned salmon—familiarly known as *pea soupa*,—the principal American export to this interesting colony of ours—is much in evidence among all Samoans. My farewell gift to royalty consisted of a great tin of ship's biscuit, and a case of Columbia River salmon, and it distinctly had the royal approval.

When your San Francisco-Sydney liner steams slowly into the mouth of Pago-pago harbor, you realize that you have exchanged oak trees for cocoanut palms, prunes for bananas, and tailored men and women for scantily girdled children of nature. Still, the first child of nature I met on Pago beach was smoking a fat cigar and carrying a lantern and a disreputable umbrella. But his clothing was a lava-lava of tapa (mulberry-bark cloth), and his skin was brown and shone with cocoanut oil. He was a Samoan in the process of making over into an American. He wanted to sell me a war club which he had whittled out since seeing the steamer's smoke, and he could say "damn."

Away from the beach, though (and "beach" means only that part of the shore line of a South-Pacific island invaded by whites), the Samoan native is a glorious specimen of kindly, honest, care-free, wholesome, child-witted,

primitive man. Almost uniformly superbly developed physically, holding up straight and free six feet of stature, and looking from clear eyes out of open, intelligent faces, the Samoan men are among the finest of the anthropologists' living specimens. Never confound the tall, brown, straight-haired Polynesians of the Marquesas, Society and Samoan Islands with the under-sized, woolly-haired, black "boys" of most of the hundreds of South Sea islands in Micro- and Melanesia. They are races apart. The Samoan women have the same attractive race-characteristics, but their physical development is not so uniformly good as in the men; the anthropologist, if collecting "methodically at random," will capture more undesirable specimens in the gentler sex.

The missionaries have mostly conquered the South Seas. In each little village of toadstool huts, the biggest mushroom of all is "mijinery house"—South Pacific for church. And Sunday is a day, the South Pacific over, devoted to earnest howlings of adapted gospel hymns by fantastically clothed barbarians. A Samoan attends from four to seven services each Sunday, beginning at seven o'clock in the morning. He comes dressed in a white lava-lava, white duck jacket, fly-flapper, and serious countenance; she comes in a gaudy Mother-Hubbard, gaudier little green ribboned, blue-feather chip hat, and white-toothed smile. Each carries a cocoanut-leaf mat to sit on and hymn book to sing from. All can read, and all can sing. It is mostly singing, though a vociferously spoken sermon by the native preacher finds its appropriate place. And the singing is tuneful for the most part, and oh, so heartily enjoyed! Any South Sea islander will praise God (perhaps any god) willingly if he may sing his praises. And the missionaries have wisely found this line of least resistance.

The missionary and the results of his labors are the subject of constant debate the world over. In the South Pacific the missionaries have wrested the natives from the hands of adventurers and beach-combers, speaking by and large. But they have delivered the natives into the hands of an awful enemy of tropic people, called Clothes. From Monday to Saturday he and she have gone healthfully, naturally and without self-consciousness mostly undressed. The swift showers have beat on their oiled naked shoulders and limbs as harmlessly as on the duck's preened plumage. The perspiration induced by the tropic sun has swiftly and coolingly evaporated as fast as it oozed out. But on Sunday the cheap cotton clothing is put on to make him and her self-conscious and immodest, and to lie soaked with rain, or between showers with perspiration, in sticky folds over the body. Result, morally disastrous self-consciousness, and physically disastrous pneumonia. Truly it is a question whether clothes do not carry the natives as swiftly and

certainly into the presence of their new-found God, as does the awful heritage of loathsome disease bequeathed them by the dissolute whalers and beach-combers of pre-missionary days.

What in the name of sane things have indecent Mother-Hubbards and appalling green-ribboned chip hats to do in the great work of leading tropical heathendom to Christianity?

There is no encouragement for white settlers in American Samoa. In fact there is no particular place for them to settle, nor anything to do after settling. There is no land for agricultural purposes, beyond the little necessary for the raising of taro for the natives to eat, and the dense forests of the mountain side have little value as timber. Over on Upolu, the principal German island, there is some flat or flattish land available for cocoanut culture. The German colonists have tried to introduce the growing of cacao but nothing worth while has yet come from this attempt. On the whole Samoa is a country whose chief interest for us must be its physiography, its marvelous beauty, and its memories as the abiding and burial place of the much-loved Robert Louis Stevenson.

THE WORLD'S HIGHEST DAM

In a narrow ravine on the south fork of South Platte River, forty-eight miles from Denver, Col., there has been completed the Cheesman dam, the highest in the world. Its solid wall of masonry is 221 feet high, and impounds 30,000,000,000 gallons of water the depth of which would cover the sixteen stories of the Home Life Insurance Building on Broadway, New York, leaving only the spire above the surface. It was built by a private corporation and cost only \$3,000,000,—a very modest sum for such a great engineering enterprise.

It almost seems as though Nature itself had intended the site of Cheesman dam to some day be utilized as a great reservoir. The cañon of the South Platte river at this point is not more than thirty-five feet wide at the bottom, and the sides are almost vertical for nearly 100 feet. At this point the cañon begins to widen, so that 200 feet above the bottom it is 600 feet wide, and 220 feet above the bottom its width is about 700 feet. From the bottom of the cañon to the summit of the dam the side walls are of solid granite. Before the masonry was laid, the loose boulders, rocks and the vast accumulation of débris were removed.

The width of this great dam on top is eighteen feet, with a 14-foot roadway. At the bottom it is 176 feet wide. The elevation of the top of the parapet walls above the sea is 6,865 feet.—*The Search Light*.

EDITORIAL

LABORATORY WORK IN SECONDARY SCHOOL GEOGRAPHY

THE necessity of laboratory work as an essential part of physical geography in secondary schools has long been recognized and for several years such work has been strongly developed in many schools.

Yet it would seem that thus far there is no consensus of opinion as to what good and efficient laboratory work is and little endeavor among teachers to follow more than the letter of the law in reference to the inclusion of laboratory work. Teachers seem not to realize that the requirement of at least forty exercises as a part of an approved course of study means forty exercises in geography and not some other subject, and that the assumption is that the forty exercises shall not be merely busy work but work of value to the pupil in making his work strong. It ought not to be a strain of the imagination to see further that the exercises should not be largely in one phase of the subject, but that they should be divided so as to show that the pupils have studied all phases of physical geography from the laboratory side.

There is a general agreement among the leaders, as is clearly shown by an analysis of the best modern text-books, that secondary physical geography should consist of four parts—the elements of mathematical geography, of the atmosphere, the lands and the ocean, with the larger part of the time, approximately one-half, devoted to the lands, because the land is the home of man.

So far as one can judge from the laboratory books submitted to the examiners of the College Entrance Examination Board, laboratory work and text-book work do not go hand in hand, and are not treated as complementary.

Almost anything that will keep pupils occupied for a double class period is submitted as legitimate laboratory work, and the larger proportion of the laboratory books contain a greater number of exercises on mathematical geography—many of them forcibly introduced and unrelated to the text-book material—than on any other phase of the subject. Summaries of text-book lessons, copies of weather maps drawn by the teacher on the blackboard, drawings of the layers in a sand bank, that do not illustrate any point, and many other exercises equally barren of any possible thought work on the part of the pupil, are presented as laboratory work. Several ways of finding the north-south line are presented as equal parts of the necessary forty counts

to be credited for laboratory work. Simple laboratory exercises in pure physics and problems in astronomy, having no possible relation to text-book or class work, are submitted as physical geography, evidently with the thought that anything can be considered geography because geography makes use of the elements of the other sciences.

The one phase of the subject that is most neglected is the lands, in spite of the cheap and easily obtained United States Topographic Maps, which may be used most efficiently as the basis for laboratory problems by any unfossilized teacher. The several excellent laboratory manuals and most of the better modern text-books give lists of the maps that can be used to the best advantage. Yet they are not used as they ought to be.

It is time that an effort be made to have the secondary schools of the country do good laboratory work in physical geography and not merely work that may be done in a laboratory.

State Examination Boards and College entrance requirements should be more explicit as to laboratory work and should establish a certain minimum of exercises in each division of the subject which will be accepted in making up the necessary forty counts. Such detailed and explicit requirements will help to make the laboratory work definite and valuable, will relieve teachers of their present uncertainty as to what is expected and will show clearly that laboratory work is expected to be a strong part of the school study of the subject—not done as a time killer but because it is essential for clearness and to keep physical geography from merely being a study of words and sentences.

The good beginning in laboratory work, which is so strong and vital a part of the course in our best secondary schools, shows what can be done and what is worth while. Schools which are still wandering aimlessly need to be helped not only that their work may be stronger but that they may get the best results from the study of the most excellent texts which have so thoroughly replaced the old memoriter texts of a little more than a decade ago.

SUMMER COURSES IN GEOGRAPHY

The EDITOR will be glad to receive announcements of summer session courses in geography for 1906 in order that a complete list may be published in the annual statement of such opportunities in the May number. The MSS. should be in hand not later than April 10.

REVIEW

COMMERCIAL GEOGRAPHY.—Gannett, Garrison and Houston, pp. vi+415+30, 1905. American Book Co., New York.

THE advent of such works as the one noted above marks progress in the growth of the conception of commercial geography in American educational circles, and their use augurs exceedingly well for the business and commercial equipment of the coming generation of merchants, *entrepreneurs*, and commercial agents. The threefold authorship of the book bespeaks for it a breadth of thought and scope of treatment which perhaps no one mind could produce. The authors recognize that man's intelligent co-operation with, and the wise uses of, his physical surroundings are very important for permanent advancement in industry, commerce, and civilization; and to that end they endeavor to show the operating physiographic, and climatic influences on industry and production.

The book consists of 410 pages, exclusive of tables and index, 87 of which are devoted to a discussion of the commercial conditions, about 75 to commercial products and 250 to the products and commerce of the several countries. While the first section, "Commercial Conditions" is a fuller treatment than is customary in American texts and proportionately equivalent to that in the last edition of the standard English text, it is not yet made a sufficiently important part for a text in Commercial Geography. The second section, "Commercial Products" with their essential geographic and physiographic relations, is not so adequately treated as is the same subject in English and German books but is superior to any other American text. This section too might well be greatly expanded. In both sections, however, we have without doubt the fullest American treatment.

The third section, "Commercial Countries," begins with the United States and runs through the list of countries. Grouping several individual countries on a physiographic basis is frequently nicely done, as in the case of the Balkan states. This method reduces the political unit, and advantageously exalts the geographic and physiographic.

Among other admirable features are, (a) much description of processes used in the preparation and manufacture of raw products. (b) Specific classifications and systematization, in many categories, as under, "modifiers of temperature," "industries," "sites for cities," "soils," "harbors," etc. (c) Descriptions of great canals of the world, and a statement of their commercial and physiographic relations. (d) Discussions of variations in comparable processes in various lands or at various dates in the same lands, as for example under the heading "transportation."

The customary lengthy tables of exports, imports, to whom, from whom, and percentages of special articles, are greatly reduced and combined at the end into five pages of valuable statistics. Diagrams and percentage values are scattered freely through the text, but actual amounts, so subject to fluctuations from year to year, are almost entirely omitted. Many illustrations and maps add to the readableness of the book. It ought to find wide usage in the High and Business School courses in Commercial Geography, and should prove a good reference work for grade geography.

G. D. H.

THE DEVELOPMENT OF TRANSPORTATION

The development of the systems of transportation which now place the producer in the interior of one continent in direct communication with the consumer in the interior of another continent is a product of a comparatively few years. Within the lifetime of men and women now living the world had not a single mile of railway or a single steamship crossing the ocean. To-day the world has on land 550,000 miles of railway, and on the ocean 6 million net tons of sail-carrying power and 18 million net tons of steam-carrying power. At the beginning of the last century the sail-carrying power aggregated 4 million tons; steam-carrying power on the ocean did not exist, nor did railways on land exist. By the middle of the century sail-carrying power on the ocean was more than 11 million tons, the steam-carrying power on the ocean was less than 1 million tons, and the railways on land were but 24,000 miles. By 1880 sail power on the ocean had reached 14½ million tons, steam power about 6 million tons, and railways on land 225,000 miles. From that time forward steam power on the ocean so rapidly took the place of the sail that in 1905 sailing vessels on the ocean aggregate but 6 million tons carrying power, while steam vessels have an aggregate tonnage of 18½ million tons and railways an aggregate of 550,000 miles in length, of which 217,000 miles, or two-fifths of the total, are in the United States. The wonderful effect on commerce of this increase of transportation power on land and ocean is shown in the fact that the international commerce of the world has grown from about 1,480 million dollars in 1800 to approximately 22 billions in 1905. Thus, under the newly created transportation systems of the last century, the international commerce of the world is to-day about fifteen times as much as at the beginning of last century, while the world's population is but two and one-half times as much as at that time, the commerce of the world's population, as a whole, having grown to nearly \$14 per capita at the present time.—*Monthly Summary Commerce and Finance, November, 1905.*

RECENT PUBLICATIONS

REPORT OF ISTHMIAN CANAL COMMISSION 1899-1901. Quarto Edition, pp. 688. With 86 plates and maps. Washington, Government Printing Office, 1904.

Contains a long and valuable paper by Professor Emory R. Johnson, on the industrial and commercial value of canal, of special service to teachers of commercial geography. The volume of plates is mostly made up of maps and sections devoted to the region of the canals. The maps showing climatic and physical features of Central America and those showing resources and industries of different countries of the world as related to the canal are of great value to the specialist in commercial geography.

THE JUNIOR GEOGRAPHY. By A. J. Herbertson, being Volume II of The Oxford Geographies; pp. 288. The Clarendon Press, Oxford, 1905.

Devoted to a summary of the Regional Geography of the world, with the largest emphasis on Europe. Logical, causal, clear and effective. Illustrated by 166 diagrammatic maps. Of extreme value for teachers' reference use, especially for teachers dealing with the eastern continents. Deserves wide usage for reference work in America.

A HOME GEOGRAPHY OF NEW YORK CITY. By Gustav Straubenmüller; pp. xvi+230. Ginn & Company, Boston and New York, 1905.

Primarily for use in the lower grades of New York City. Deals with local geography and local history of New York City. Illustrated by excellent series of photographs including many of New York City of long ago. Interesting, graphic and full of information. The best book on the subject for children which has thus far appeared.

LEITFADEN FÜR DEN UNTERRICHT IN DER GEOGRAPHIE. By H. A. Daniels; pp. viii+264. Halle, 1905.

A brief and condensed manual of geography, including mathematical, physical, political and regional geography. Good volume for reference for facts.

ARTICLES IN THE CURRENT GEOGRAPHICAL MAGAZINES

The Parsees and the Towers of Silence at Bombay, India, by Consul General W. T. Fee. *National Geographic Magazine*, December, 1905.

A splendidly illustrated account of the religious history, personal characteristics, manners and customs and social development of the Parsees. Most interesting description of this little known religious sect who have retained their individuality for more than a thousand years, though living amid the Hindoos.

Early Western Explorers and the Railroads. *Bulletin of the American Geographical Society*, December, 1905.

A brief account of the way in which the transcontinental railroads follow, in general, the routes originally followed by the explorers of the region.

The Partition of Sakhalin, *Bulletin of the American Geographical Society*, December, 1905.

A brief account with map of the island of Sakhalin, recently divided between the Japanese and Russians.

NOTES

THE NORTHWEST PASSAGE AT LAST ACCOMPLISHED.—Of the three great geographical problems reserved for our contemporary explorers in the Northern Hemisphere, one, the discovery of the Northeast Passage around the Russian and Siberian coast from the Atlantic to the Pacific, was solved not many years ago by Nordenskiöld, of Sweden. It now appears that to a Scandinavian must be credited a second memorable achievement, the accomplishment of the Northwest Passage, known to exist, but never previously traversed in its entirety by the same navigator, from Baffin Bay to Bering Strait. We say accomplishment, because although Captain Amundsen has left his sloop, the *Gjoa*, for the winter at King Point on Mackenzie Bay, the rest of the voyage to Bering Strait is no difficult feat, being performed annually by whalers.

It will be remembered that scarcely had the land found by Columbus been generally recognized as forming no part of Asia, but as an independent continent, when attempts were begun to reach Cathay and the East Indies by rounding the vast unexpected obstacle on the south or on the north. The circuitous Southwest Passage was presently found by Magellan, but his success only stimulated other explorers, and especially those of Northern Europe, to search for a northwestern route to Asia, which, obviously, if it existed, would be incomparably shorter. Some three hundred and fifty years, however, were to elapse before the existence of such a route was believed by geographers to have been demonstrated, and the actual performance of the voyage by one and the same vessel from the Atlantic to the Pacific around the Arctic coast of North America was left for the twentieth century.

For three generations after Columbus the efforts to circumnavigate the northern edge of the American continent proved fruitless, except for the light they cast on the configuration of the Atlantic shore. In 1585, however, an important step in the right direction was made by John Davis, who penetrated the strait which bears his name; and about thirty years later another English sailor, William Baffin, after traversing the bay named after him, reached the long unequalled latitude of 77 degrees 45 minutes north. Not until 1818, however, was Lancaster Sound discovered, after which, in the course of a quarter of a century, several westward pointing channels were traced through the Arctic archipelago, until at last Banks Land, Prince Albert Land and Victoria Land were discovered on the western side of Melville Sound. Ultimately the existence of a northwest passage to Asia was proved by the fact that certain points were identified by explorers com-

ing from the west as having been previously reached by visitors from the east, although, as we have said, the whole voyage from Baffin Bay to Bering Strait has never yet been made by one and the same ship.

Although the *Gjoa*, to which is promised a share of the *Vega*'s immortality, is only a small sloop of 46 tons, manned by eight sailors, her officers are qualified for the work of exploration by experience and scientific attainments. Captain Amundsen was first officer of the *Belgica*, employed in the Belgian attempt at south polar exploration, and he is accompanied by Lieutenant Gotfried Hansen, of the Danish Royal Navy. It is more than two and a half years since the *Gjoa* left Norway on June 1, 1903. The first stop of the little expedition was made at Godhaven, Greenland, and the first base station was established near the Island of North Somerset. At Leopold Harbor in 1904, the explorers made extensive magnetic observations, and in the spring of the present year they set up their self-registering instruments on King William Island, where, as we are justified in inferring from a telegram sent by Captain Amundsen to Fridtjof Nansen at Christiania, he definitely located the north magnetic pole, which in 1831 Captain J. C. Ross, relying on a single observation, had placed in the peninsula of Boothia. This was the capital scientific aim of the present expedition.

We add that, according to a private cable received at Seattle from the explorer, who, leaving his vessel to winter at King Point, had gone overland to Port Egbert, Alaska, Captain Amundsen found on King William Island a monument erected by the ill fated Sir John Franklin's expedition. It will be remembered that in 1878-80 Lieutenant Schwatka's expedition came upon the skeletons of some of Franklin's men and of one of his lieutenants. It may be reserved for the Norwegian explorer to find the remains of Franklin himself, and to place them at last beneath the cenotaph in Westminster Abbey which now bears the inscription:

"Not here! The white North has thy bones; and thou,
Heroic sailor soul,
Art passing on thine happier voyage now
Toward no earthly pole."

—*The New York Sun*.

NOTES ON AMUNDSEN'S ACHIEVEMENT.—The attempts to make the Northwest Passage have cost very dear in human life and in treasure. They involved the greatest of Arctic tragedies—the loss of the Franklin party of 129 souls. They resulted in the destruction by ice crushing of some of the stoutest ships that ever were built. But the Passage has at last been made, by a vessel large enough to accommodate only a few men with comfort and fitted with a petroleum engine! The *Gjoa* from the Atlantic has reached the

waters near the mouth of the Mackenzie River that are frequented every year by whalers from Bering Strait.

Last summer when Amundsen was about to start westward for Bering Strait he sent a messenger south to the Canadians in Hudson Bay telling them of his purpose to steam westward through the channels. Henry Hudson was hunting for this Northwest Passage when his crew put him adrift in Hudson Bay. He perished in the same waters over which the news was brought to us that the little Norwegian party was about to attempt the Passage.

From 1818 to 1855 the British sent out ten large expeditions with seventeen of their finest ships to make this Passage, if possible. They all failed to push the ships through, and it was not till after 1850 that the existence of continuous sea communications north of America was made known. In that year McClure, coming from the Pacific through Bering Strait, reached with his sledges the northeast extremity of Banks Land, which Parry, coming from the Atlantic, had visited in 1819. It was years later before we knew of Sir John Franklin's earlier discovery of a shorter route for the Northwest Passage.

When the records of the Franklin expedition were recovered it was found that in May, 1848, Lieut. Graham Gore, with seven men of the party, had explored the shores of King William Land. Soon after passing Point Victory they saw the continent of North America in the distance and realized that the long sought for Passage had at last been discovered. They had reached the point from which Simpson had traced the edge of the Arctic Ocean hundreds of miles west to Cape Barrow, and they might actually have accomplished the Northwest Passage themselves had they been able to force their ships through the short stretch of ice to the opening channels along the American coast.

Those Arctic heroes who starved to death were the first to discover the Northwest Passage; and the route indicated in their records is that which Amundsen has followed to success, for the Passage has been made by the route discovered by the Franklin party fifty-seven years ago.

Point Barrow was never reached by Cook or Beechey, but every season now even the sailing vessels among the whalers pass around it and far to the east. They travel in the channels opening between the heavy floe ice and the mainland, and this is the route that Franklin and Simpson discovered. Its practicability has now been demonstrated by one of the smallest vessels that ever entered the Arctic.—*The New York Sun*.

THE KINGDOM OF NORWAY.—By a vote of about four to one, the people of Norway have decided upon a kingdom instead of a republic as their

future form of government; and by a unanimous vote the Storting has chosen Prince Charles of Denmark as King of Norway. He has accepted the position, and will adopt the name of Haakon VII. First united with Sweden, by the marriage of a Norwegian princess to a Swedish king, later in union with Denmark, and again with Sweden, it has been nearly seven hundred years since Norway has had a king of its own who was not also ruler of one of the other Scandinavian kingdoms. The union with Denmark, which lasted from 1397 to 1814, was more intimate than that with Sweden, which has just been dissolved by one of the most peaceful revolutions in history; but the Norwegians always considered themselves a separate people. Dr. Fridtjof Nansen, the famous Arctic explorer, comes as the first Norwegian minister to Great Britain; and a daughter of King Edward VII., as wife of Prince Carl, becomes Queen of Norway.

JAMESTOWN PAST AND PRESENT.—On landing at Jamestown Island we give ourselves up to the task of rebuilding and repeopling the little town which speaks so eloquently to every American citizen. Turning to the left, for there the tower beckons, we enter the church enclosure. Here are the foundation walls of three of the five Jamestown churches and we examine with reverent interest the inner line of bricks, which we are told supported the wooden walls of the third Colonial church, the one in which met the first General Assembly of Virginia. We picture the governor, the deputy governor, the council, and the twenty-two burgesses walking in dignified procession up the narrow aisle of the little church, as with stern, serious faces they proceed to transact their important business—a different scene indeed from the squalor and misery that filled the little village only nine years before when Lord de la Warre saved the colony. Was it here, we wonder, that Pocahontas was baptized and here that she was married? Alas! we learn that the little chapel which witnessed these scenes in the life of the Indian maiden who gave a touch of romance to the rude pioneer town, was inside the palisaded fort now buried under the restless waves of the James. It was just yonder, a stone's throw; while still further out in the water is hidden in the sand of the river bottom the spot on which the Jamestown settlers stepped from their ships. No Plymouth Rock this to withstand forever the action of the waves!

But let us turn again to the foundation walls and the pavements of the churches. Here are the tiles in the chancel of the wooden church and above them the two sets belonging to the two brick churches built on the same foundations. The tower was too massive to be destroyed when the town was fired in Bacon's Rebellion and still gives proof of its age in the "bonded" English brick of which it is made and in the loopholes near its top

which indicate that it was used for defense from the Indians before Opechancanough removed that danger by his death. The worshipers who were wont to gather in these two churches now rest in the ancient graveyard outside. Here lie Dr. James Blair, "Commissary of Virginia and sometime minister of this parish," and his wife, Sarah, a daughter of Colonel Benjamin Harrison. A young sycamore starting between their tombstones carried with it, in the strength of its young life, a portion of Mrs. Blair's tombstone to the height of ten feet. This was accidentally released in 1895 and the tree has nearly closed the cavity, growing meanwhile to an enormous height and shading the whole graveyard. How typical of the gigantic growth of the infant republic born here! All about the old graveyard lie ancient stones, many of them in fragments, and some with their inscriptions quite indecipherable; beyond the enclosure, on the bank of the river, have been found human skeletons lying in such positions as to indicate that the graveyard once extended to the James. We are told that the present lot is but about one-third the size of the original, and when we think of the thousands who perished at Jamestown in the early days we are not surprised that human remains have been found in nearly every part of the island.

Virginians have at length awakened to a realizing sense of the importance of preserving what remains of our first settlement. The ancient foundations of the town are being uncovered and every possible effort is being made to keep in good condition what is left of the sacred objects in the church enclosure. So far as possible the tombstones have been mended and the inscriptions made more legible, further vandalism being prevented by a caretaker who lives on the island.

Leaving the graveyard we walk thoughtfully past the earthworks of 1861, now grassgrown and forming part of a shady park peopled with mocking-birds and cardinals. Beyond, we come to the "third ridge" where recent excavations have laid bare the foundations of a row of houses, one of them being the State House in front of which Bacon drew up his soldiers and demanded his commission of Sir William Berkeley. The next one belonged to Colonel Philip Ludwell under whose direction the town was rebuilt after Bacon's Rebellion. As the excavations proceed it will be possible to picture the town as it looked during its last days.

It is now nearly three hundred years since the landing at Jamestown, and the anniversary is to be fitly celebrated by the proposed Jamestown Exposition. It is unfortunate that the site of the first settlement is so unsuitable a one for its ter-centennial that it must be held some distance away at Sewell's Point on Hampton Roads. But surely no American who attends the Exposition will be so unpatriotic as to fail to visit Jamestown Island, the scene of his nation's birth.—*The Southern Workman*.

TREE PLANTING BY RAILROADS.—The rapidly diminishing supply of timber for wooden cross-ties, as a substitute for which metal has so far failed, has led the managers of several great railroads to undertake the planting of trees to supply ties. The Pennsylvania is planting the yellow locust and certain western railroads the catalpa. During this year the Pennsylvania plans to extend its plantations to more than 100,000,000 trees; but these if fully grown would supply ties to this single railroad system for less than three years. It is said that in order to have a constant supply for the future this railroad must set more than a thousand acres with trees each year.—*The Nature Study Review*.

IMPORTATION OF SUGAR INTO THE UNITED STATES IN 1905.—The sugar brought into the United States in the year about to end will exceed 150 million dollars in value. More than 50 million dollars' worth of this comes from our own islands of Hawaii, Porto Rico, and the Philippine Islands, and more than 100 million dollars' worth from foreign countries. The total value of sugar brought into the country in the year 1905 will by far exceed that of any preceding year. In the ten months ending with October the total value of sugar brought into the country was 144 million dollars, and as the figures for the month of October alone exceed 8 million dollars it is quite apparent that the additions made in the months of November and December will carry it far past the 150 million dollar line. Never before the year 1890 had the value of sugar imported reached as much as 100 million dollars. In the fiscal year 1891 it was 105 millions, and slowly increased until in the fiscal year 1894 it was 127 millions. Then the total fell again below 100 millions, and so remained until the fiscal year 1900 when the total was again 100 millions, but in no year has it reached anything like the figure which the present calendar year promises as the total value of sugar brought into the country.

This remarkable record which the year 1905 will present of more than 150 million dollars' worth of sugar brought into the United States is due rather to increased prices than to an increase in quantity. The total quantity of sugar brought in from foreign countries, and from Hawaii and Porto Rico combined, is, in the ten months ending with October, 1905, 4,458,290,379 pounds, and in the ten months ending with October, 1904, was 4,643,808,298 pounds. Thus the actual quantity of sugar brought into the country in the year about to end will be something less than that of last year, while the valuation, which is based upon the selling price at the ports from which it is shipped to the United States, will be more than 40 million dollars in excess of the valuation of sugar brought in during last year.

ALASKA.—That agriculture can be successfully prosecuted has been clearly demonstrated, \$5,237 worth of agricultural implements having been

shipped into Alaska during the last fiscal year. Wheat, barley, oats, potatoes, and hay have been harvested; strawberries, cauliflower, and other plants have been cultivated. There are four agricultural experiment stations in the district; one at Sitka, given largely to the cultivation of nursery plants and their distribution; one at Kenai, on Cooks Inlet, testing the native and imported grasses and dairy work, and one each at Copper Center and at Rampart, on the Yukon River, where grains are tested. Dairying promises to be one of the chief industries, owing to the enormous wealth of grasses in southwestern Alaska. Milch cows have long been kept at most of the coast settlements, and they do very well while feeding on the green grasses. Many admirable sites for dairying colonies or settlements may be had on Kodiak Island, or other islands, and on the mainland. The Finnish colony on the Kenai Peninsula will engage itself in this industry.

Although the mineral wealth of Alaska is at present its most attractive resource, the rich alluvial deposits of gold in distant parts attracting thousands of men hoping to secure fortunes quickly, the governor states that this industry is not in a satisfactory condition, owing to the failure of the Government to extend to it the same fostering care as to other industries in the district which are looked after by resident Government agents. He thinks that this can be remedied by the appointment of a resident mining commissioner.

Gold is being found in nearly every part of the district, and the advance in the several localities during the past year has been marked and gratifying. New discoveries and locations have been made in the country between Ketchikan and Juneau, the latest discovery being on the west side of Chichagof Island, about 60 miles north of Sitka. A considerable amount of gold has been taken at Cape Yakataga, about 65 miles east of Kayak. The whole area south of the Yukon and north of the sea seems to be gold producing, a great part being unexplored. The output of gold from the mines for the year has been about \$10,000,000. Silver has been produced in considerable quantity from the galena ore in the Sheep Creek mines, near Juneau, and large galena deposits, rich in silver, have been discovered at the head of the Fish River, emptying into Golofnin Bay in Norton Sound. Copper is being extensively mined, a number of such properties being located upon Prince William Sound.

Alaska is also rich in coal, almost beyond calculation, its quality being put down by experts as the best on the Pacific Ocean. The Alaska Central Railway, running north from Seward, expects to tap important coal fields on the Matanuska River and deliver the coal at its bunkers at Seward. Hard coal is also found at Cape Lisburne on the Arctic on nearly the sixty-ninth

parallel. Petroleum, gypsum, and marble are also found in great quantities, and it is understood that contracts have been entered into for the delivery of large lots of marble on Puget Sound. The governor thinks that in time diamonds will be discovered, considering that volcanoes have been very active in the district in past ages.

The total pack of the salmon canneries for the past year will be about 1,500,000 cases of 4 dozen 1-pound cans to the case, but the prices have been rather low, as there has not been an active demand for these products. A number of canneries were not in operation. The governor thinks this condition is due to the lack of sanitary precautions, and that upon failure of the owners to agree among themselves upon rules and regulations for cleaning, handling, and packing this product the Government should promulgate rules for a rigid inspection and have an officer at each cannery to see that the same are strictly complied with.

Halibut and cod are very abundant and are being sent to the eastern markets; herring are caught in large quantities, and the oil and guano factories are using them for their work; after the oil is extracted they are turned into fertilizer. At Juneau the small herrings are being put up for sardines, and as the product seems to give entire satisfaction, the demand for them is increasing. The governor is of the opinion that the wealth of the sea along the Alaskan shores in time will bring to her inhabitants as much wealth as her hills and valleys yield in gold.

The exports of furs and fur skins is given at nearly \$500,000, but as the finest grades can be placed in a small compass and handled as personal baggage, it is doubtful whether that amount covers the whole value.

The seal rookeries are becoming year by year smaller, and the killing by the North American Commercial Company's agents during the past year has been about 13,000 on St. Paul and 1,300 on St. George Island. The governor states that it would be good policy for the Government to come to a friendly understanding for the remainder of the lease with that company, based upon the number taken the last five years, stop the killing for eight or ten years, deport the natives on both islands, and keep there only the necessary agents to look after the rookeries. To prevent the entire extermination of these animals some such immediate action is necessary.—*From Report of Secretary of the Interior for year ending June 30, 1905.*

RELATION OF GEOGRAPHY TO NATURE-STUDY.—The *Nature-Study Review* for September, 1905, contains a long and interesting article on the Relation of Geography to Nature-Study with complete outline of course for eight grades. The following extract shows the point of view of the author

and suggests the plan on which his inclusive and suggestive course is outlined:

GEOGRAPHY AND NATURE-STUDY.—Geography, as we have seen, should begin with facts open to observation in the home district, and the pupils when thoroughly grounded in the meaning of the relations existing there are then prepared to extend their studies intelligently over the world.

One of the first principles of nature-study is that it shall deal with facts open to the personal experience of the pupils, and these are necessarily bound up with his home surroundings. Geography and nature-study then, in the earlier years of school life, deal from the same standpoint with practically the same materials. For the first three years, at least, we cannot differentiate them in practice. Possibly in the fourth year it may be best to do so, although even here both subjects continue to deal with the home, but from somewhat different standpoints.

There appears to be a deeply rooted tendency, in planning courses of study for the elementary school, to separate closely related facts in order to make them fit into our artificial systems. The child sees things as wholes and understands much better if related facts are presented in their natural associations.

Another mistake constantly made is to expect too much of young children in the way of forming ideas and mental images of what is outside of their experience. How can we expect them to comprehend world relations, or to make other than parrot-like responses before they understand the meaning of similar relations in the little world about them? The fifth year is certainly early enough to begin the formal study of the earth as a whole, although this is far from implying that all reference to the world as a whole be omitted up to this point. Through nature-myths, folk-tales, stories of children and life in other lands the pupils will imbibe incidentally general notions which will form a setting for the more advanced work when they are advanced sufficiently to take it up. Even after general geography has been begun the home must still continue to be the datum mark to which the pupils will constantly refer for comparison with what they are attempting to learn about similar relations elsewhere.

This undifferentiated work of the first four years, through which the pupils come to understand their surroundings, we may call either home geography or nature-study, preferably the latter, for it conveys a wider and more generalized meaning. It would be better still if we had a comprehensive term similar to the German "heimatskunde," or "home-lore" as it has been translated.

The criticism that geography is a mere jumble of facts from different

sciences and that to modernize the subject these should be segregated in primers, each dealing with a particular science, is wrong in theory and has been shown to be so in actual practice. Geography, as we have seen, has a definite content and a particular purpose to fulfil. If we separate its component parts we are destroying the subject and the higher outlook upon the phenomena of the earth which their synthesis affords us.

Marked differences in practice exist in different cities of the United States as to the time of beginning geography, although nature-study wherever taught is usually found in the first grade. In Chicago the two subjects are combined for the first three years. In Boston and New York nature-study begins in the first grade and geography in the fourth, while in the former city the study of natural phenomena from the fourth grade upward is termed "elementary science." In the Horace Mann School of Teachers College, New York, work under geography is begun in the third grade. The University Elementary School of Chicago closely correlates both geography and nature-study throughout the course. It is probable however that the differences in practice are not as great as they appear upon paper, for much that is really geography is often included under nature-study.

Beginning with the fifth year, geography has to do mainly with facts beyond the experience of the pupil, while nature-study is still largely confined to the home district. It is apparent that as a usual thing little attempt is made in arranging courses of study to correlate nature-study and geography. After the two have separated at the beginning of the grammar-school period it is evidently not possible to make a complete correlation because the fields covered are not the same, and yet, these studies are nearly related and should be made to harmonize and mutually support each other as far as possible. Such an arrangement would aid in giving a plan to the nature-study work, for the lack of system has been a partial cause of the frequent failures.

Such topics from the home district as the relation of the climatic conditions to the features of the land, to bodies of water, to the direction of the wind, etc.; the relation of plants and animals to their environment, the dependence of man upon the various physical conditions about him; are phases of nature-study from one point of view, while from another point of view they are clearly geographic.

The carrying out of experiments in evaporation, solution, and crystallization is nature-study, but when this is done in connection with the study of the great deserts of the world it aids in the acquirement of real geographic knowledge. The deposits of salt, soda, borax, and nitre are

governed in their formation and distribution by the principles exemplified in the physical phenomena referred to. Numberless other examples could be given if it were necessary, to show how nature-study can support and elucidate the facts of geography.

If the infinite detail, too often present, could be omitted from all courses of nature-study, as well as all those topics which cannot appeal to the child mind, and the work be so shaped, particularly in the upper grades, as to throw light upon the geography the work in both subjects will be made more satisfactory.

Nature-study dealing with the phenomena of our environment; geography beginning with the same phenomena, but ultimately extending its scope to take in their world relations; and history, the development of man under various physical and sociological conditions should be considered as practically one subject in the earlier half of the elementary-school course, and as closely related subjects in the later half. Although we are still very far from being perfect in practice, yet one important step has been gained in the growing consciousness that the only way in which the child can gain any real benefit from his study of the facts of the phenomenal world is to deal with them in their natural settings.

With the differentiation of nature-study and geography at the beginning of the grammar-school period there are new problems to be solved. How shall the geography of distant regions be treated so as to produce the most distinct and permanent mental images? In the first place we must abandon the method of the present text-books, and cease skimming over the world in a formal and almost meaningless manner. We must, rather, take up the study of the world as a living organism whose parts and functions are mutually dependent.

The relief, climate, the plants and animals of the home district and man's relation to them must be made the starting point for the study of similar things in remote districts that the child has not visited, and must continue to form a constant source of inspiration for such study, as long as it lasts.

The attempt at memorizing the disconnected facts of geography has generally proved a failure. To avoid this waste of energy these facts must not only be presented in their causal relations, but also in such a manner as to arouse the attention and interest. History, stories of adventure and discovery, current events, and a familiarity with the natural phenomena of the home region all aid in vitalizing the facts of geography."

HOW TO BEGIN GEOGRAPHY.—A subject can be so taught that pupils learn much and are worse off than if they had never learned it. Knowledge gained at the cost of hatred for a subject, or at the expense of further interest

in it, is of doubtful value, to say the least. It is a serious mistake to limit the outlook upon a subject to the work of any one grade, or so to present matter that "results" for the term can be measured by the facts learned in that line. That teachers need to know thoroughly the work of their particular grade no one will dispute; but that they need to have a good idea of the entire field is also indisputable. For a pupil to go through a half year or a year and have at the end of that time no educational product would be a pity; but that many go through one grade after another seeing only certain tasks to be mastered in each, and with no abiding interest in any subject as a whole, is also a pity. The broad outlook that takes in the subject as a whole is especially needed in beginning geography. Geography should be taught from beginning to end as a world-wide subject, and the work of the first five months is not to teach a certain portion but to prepare for the teaching—to arouse an interest in the subject and put the pupils in the way of satisfying that interest. It is the work of this grade to select the site and collect the material to be used later in building the superstructure. Here the foundation is laid, and it behooves us to dig deep into the child's experience, to search the hidden recesses of his imagination, that we may found upon the firm rock of intelligence the structure of knowledge we plan to rear. We should give him such a basis for his work that he may himself build thereon during all the years to come. By a get-geography-quick plan a map of some section is placed before the pupils and they are set to work bounding, locating and describing. This drudgery may provide some facts for glib recitation, but it will probably create a dislike for the subject and give a distorted notion of a map that no future teaching, however good, can entirely eradicate. Better far begin by using the geography that the children have learned outside of school—for they have learned much, though they have never dreamed of calling it geography—and lead up to map study in such a way that a map of any kind will thenceforth possess for them a world of meaning. The great aim in this first work should be to develop a conception of geography that will make future work rational and interesting—a conception that will forever avert the danger of a crooked-black-line notion of the Mississippi river, a pink Switzerland. The "results" to be looked for in this grade are an intense interest in geography and an ability to use maps and other material intelligently. Incidentally some "geography" will be taught, but that is not to be the aim. Be content in this grade to lay the foundation, leaving it to another to build thereon.

There is no need to-day to argue that this foundation work should begin with home geography; every student of method admits that. The question now is, what is home geography? How shall it be begun? Shall it be by

making a diagram of the schoolroom and drawing various nearby sections to a scale? Children do not seem to be much at home in the geography begun in this way. Such work undoubtedly has its place, but not as an introduction to the study of geography. It is too mechanical and uninteresting; more than that, it puts the emphasis in the wrong place; a map should appeal to the imagination, and geography should enable one to picture things in the large; to begin by ruling off a room destroys geographical perspective; sets the class to using an inverted telescope, so to speak.

Or shall we begin home geography with a study of the soil of the locality? The great difficulty with this suggestion for schools in large cities is obvious, but even where the soil is not covered with paving stones, but is easily accessible—in country schools—is not this beginning geology rather than geography? Is it with the study of the soil, the river, the plain, as such, that geography is concerned, or is it the soil in connection with the beet sugar (or some other) industry, the river as water power, or a water-course, or a bit of scenery—as serving man's need or suiting his fancy—that claims the geographer's attention? If the former, then let us take a pan of dirt and build our earth and then people it; if the latter, then let us start with the people and their activities, catching a glimpse of the bigness of the life around us with its interrelations with a whole world, and then follow back into the sources of wealth and beauty; the one calls for the microscope, the other for the telescope; which is the geographical instrument per excellence? You may say, "What matters it whether the study of the soil come the first week or three months later, since by either plan the soil is to be studied at some stage?" The difference lies in the fact that the one gives a near-sighted view, the other a broad introduction. I want the child to discover what it is all about and to get a notion of the interdependence and mutual obligation of all life—of the greatness of the world—ere he settle down to study one detail, so that the detail shall not be petty. In treating of the earth in its relation to man it is not necessary to begin with the stranger Earth and back around to an awkward meeting with the old acquaintance Man. Man should be the starting point—no, not man, boy—the boy in his home with his cap and shoes, his bread and butter, his comforts and his duties. It is not far from the sidewalk shovel and the kitchen broom to the street cleaning department; from the parents providing for the home and directing its interests with the help of children and servants to the mayor (or the village president) with all of his assistants. It is only a step from the cereal on the breakfast table to the wheat fields of Kansas or of Austro-Hungary, but it is thousands of miles if you reverse the order. Begin with informal discussion of the home, with its people, their needs, how these needs are satisfied,

its government, etc.; then broaden the children's horizon by a discussion of other homes—homes of birds, squirrels, Eskimos, Indians. Then lead by talks—in all of this work get the children to do the most of the talking—to an appreciation of the time when there were no homes here but those of birds, wild animals, Indians; and develop an idea of the conditions that must have existed—no streets, of course, but paths made by animals, paths to neighbor's houses (these are the beginning of streets); no stores, each family obliged to raise its own provisions (then comes informal trading with each other, and later the first store); no churches; no schools. Then step by step build up the city you live in, mingling local history with geography, appealing constantly to the imagination and drawing all the time from the child's experience. Accompany all of this work with rough diagram on the blackboard; use pictures whenever they can be obtained; but use no map, no text-book, no globe, until later.—*School Century*, December, 1905.

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Brazil, *Consular Report*.

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Cotton the Dominant Industry, *Consular Report*.

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Domestic Service: The Maid-servant in England and America, *World To-Day*.

Gasoline, The Age of, *Rev. of Revs.*

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German Trade, The Menace of, *World's Work*.

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Merchant Marine and the Manufacturers, *The Mfr.*, Nov. 1.

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Russia, The Russian Oil Situation, *Paint, Oil and Drug Rev.*, Nov. 1.

Salmon Fisheries of the Northwest, *World To-Day*.

Spain's Economic Advance, *Rev. of Revs.*

Transportation, Pioneer, in America: Its Curiosities and its Romance, Part II, *McClure's Mag.*—E. D. J.

THE TROPICS.—All parts of the equatorial zone are not equally disagreeable or hostile so far as occupation by the white race is concerned. Many elderly persons and those who are overworked may find rest from nervous tension in the enervating climate of the tropics. The dryer districts are to be preferred to the moister, the higher altitudes to the lowlands, coasts and islands well ventilated by prevailing winds to regions where the air is stagnant. Much-needed relief from the heat at sea-level may be obtained by resort to tropical mountain stations, and many of these have become well-known health resorts. Tropical mountain climates resemble the climate of the temperate zones in their lower temperatures and in certain other ways, but they can never be the equivalent of a temperate zone climate, for they lack the seasonal changes. Some tropical climatic characteristics disappear with altitude while others change little. The non-seasonal character of tropical mountain climates, the so-called "perpetual spring," is not by any means the best fitted for man's physical and mental development, however pleasant it may be for a time. With increase of altitude, there is a decrease in or a disappearance of some of the diseases which prevail near sea level, such as malaria, yellow fever, liver abscess, etc. In their stead, however, may come an increasing frequency of diseases which are characteristic of high latitudes, such as rheumatism, and heart and lung troubles. Tropical hill stations in India show a smaller mortality among

the troops than do lower levels. In India, as elsewhere in the tropics, hill stations are beneficial in restoring those who are exhausted by overwork or by the heat of the lowlands. They are especially advantageous for delicate women and children. Nevertheless, climates which are temperate because of altitude in the tropics cannot replace climates which are "temperate" because of latitude.

The acclimatization of the white race in the tropics is a question of vast importance. Upon it depends the control, government and utilization of the tropics. It is a very complex problem, and it has been much discussed. It is complicated by the controls exercised by race, diet, occupations, habits of life and the like. To discuss it fully is impossible at this time. The gist of the matter is this: White residents from cooler latitudes on coming into the tropics must adjust themselves physiologically to the new climatic conditions. During this adjustment there is more or less strain on various organs of the body. The strain may be too severe; then the individual suffers. The adjustment is usually much retarded and hindered by a persistence in habits of food, drink and general mode of life which, however well suited to the home climate, do not fit tropical conditions. During the adjustment, especially if complicated by irrational habits, the body is naturally sensitive to the new diseases to which it is exposed. Even should no specific disease be contracted, there are anæmic tendencies and other degenerative changes. Experience teaches that white men cannot with impunity do hard manual work under a tropical sun, but that they may enjoy fairly good health as overseers or at indoor work, if they take reasonable precautions. Acclimatization in the full sense of having white men and women living for successive generations in the tropics, and reproducing their kind without physical, mental and moral degeneration—*i. e.*, colonization, in the true sense,—is impossible. Tropical disease and death rates, as has been abundantly shown, can be much reduced by proper attention to sanitary laws, so that these rates may be not much, if any, higher than those in the extra-tropics. And with increasing medical knowledge of the nature and prevention of tropical diseases, as well as by means of modern sanitary methods, a white resident in the tropics will constantly become better able to withstand disease. As Manson has put it, acclimatization is less "an unconscious adaptation of the physiology of the individual" than "an intelligent adaptation of his habits." For greater comfort, for better health and for greater success, properly selected hill stations will, however, always be essential to northerners who have to live in the tropics, especially to white women and children.

children.—*The Hygiene of Zones, Bulletin Geographical Society of Philadelphia, January, 1906.*

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THE GEOGRAPHY COURSE IN THE OSWEGO STATE NORMAL AND TRAINING SCHOOL

BY AMOS W. FARNHAM
Oswego, New York

PART I

THE geography work to-day in the Oswego State Normal and Training School is considered from three different view points: (1) subject matter, (2) method, (3) practice. The subject matter is taken up in the second year of the academic course, thirty-nine weeks, five forty-five minute periods weekly being devoted to it. Besides this time for class-room work, there are two periods each week given to laboratory work, and as much time as is necessary for at least eight field lessons. Two years later in the Normal course are given twelve weeks, five forty-five minute periods weekly. And in the term immediately following method is given twenty weeks, three forty-five minute periods daily for practice teaching in the school of practice. The school of practice embraces nine years below the high school (and above the kindergarten), but the work of geography teaching does not begin until the fourth year, and it is usually finished during the first half of the ninth year. The teacher of subject matter and of method has the supervision of geography teaching in the school of practice.

The purpose of the work in geography is of twofold purpose: (1) utilitarian and (2) cultural. From the standpoint of utility, geography is far reaching. It is believed that a knowledge of geography is necessary for successful study of history, also for intelligent reading of current events (history in the process of making). Literature cannot be fully appreciated without a knowledge of certain related geographic facts. Geology, botany, and zoology are sciences so interwoven with the science of geography that they could not exist in their completeness apart from geography.

It is evident that the utility of geography leads to and comprehends the culture that geography teaching is intended to give. The study of the earth in its relation to man (how earth environment has influenced man and how man has influenced his earth environment) not only trains the mind to discover the practical, but it makes one a more efficient social factor. An interest in geography begets an interest in history and all other related subjects, and therefore forms and strengthens the reading habit. Hence it is impossible to say where utility ends and culture begins.

THE SUBJECT MATTER OF THE COURSE LOGICALLY CONSIDERED

(Substantially the new course prescribed by the New York State Education Department, and which meets the college entrance requirements.)

I. The Earth as a Planet.

A. Origin.

1. Solar system (lesson in lecture room with lantern slides).
2. Nebular and planetesimal theories discussed.
 - a. The sun: What it is, its comparative and absolute size, its absolute and comparative distance from the earth, gravitation and its law considered, its heat and light and their effect on the life of the earth. Diagram of the solar system made to show comparative size of its members, their order and comparative distance from the sun (laboratory).
 - b. The moon: Its origin and relation to the earth, its comparative and absolute size, its distance, motions (3), its light, phases, eclipses—their cause and what they prove.
 - c. Meteors and falling stars. What they are and when most numerous.

B. Shape—geoidal.

1. Cause: gravitation and centrifugal force; the latter illustrated by rotating elastic hoops.
2. Proofs: Changes of altitude of star groups with change of observer's latitude. Eudoxus' Star Problem stated and explained (laboratory). Lunar eclipses (first given as a proof by Aristotle), circular horizon everywhere, increased horizon as observer's altitude is increased, phenomena of outgoing and incoming ships the same in all directions and in all latitudes (first given as a proof by Strabo). Diagrams made to illustrate (laboratory). Variation of time with longitude, illustrated on "New Century" maps of the world, Mercator's projection (laboratory), circumnavigation.

Magellan's voyage charted on maps of the world (laboratory). Weight of a body increasing slightly with increase of latitude (Newton's proof).

3. Effects of practically uniform gravity on human activities.

C. Size.

1. Measurements: Polar diameter, equatorial diameter, circumference, area.
2. Comparison with corresponding measurements of sun and moon.
3. Problem of Eratosthenes historically and mathematically considered (laboratory).

D. Structure: Centrosphere, lithosphere, hydrosphere, atmosphere. Diagrams made to show the order and comparative thickness of these "spheres" (laboratory). Their interrelation and relation to life noted. The relation of plumb lines to earth's radii noted, and ideas of "up," "down," "level," "antipodes," "zenith," and "nadir" developed.

E. Motions.

1. Rotation: time, direction, distance.
 - a. Results: determination of axis, poles, equator, bulging at equator and consequent flattening at poles (hence largely determining the shape of the earth), cardinal points and cardinal directions, apparent daily motion of all visible heavenly bodies, unit of time—the day, habits induced by man, animals, and plants from alternating periods of light and darkness, deflection of atmospheric and water currents and of falling bodies.
2. Revolution: time, direction, distance.
 - a. Orbit: shape, size.
 - b. Inclination of axis, also of axes of other planets.
 - c. Results of inclination of earth's axis and revolution; change of seasons and fixed boundaries of light zones.
Diagram drawn to scale (1 in. = 1,000,000 mi.) to show true form of earth's orbit, sun at north focus, the earth in position at the equinoxes and the solstices, the line of apsides (laboratory).
Diagram drawn to show positions of earth, sun, and moon at the different named phases of the moon; also a diagram to show the true movement of the moon during one month (laboratory).

On maps of the world, globular projection, determine the length of the day at any latitude at any time of the year; also find the place of sunrise and sunset at any latitude at any time of the year. Determine the altitude of the midday sun at any time to an observer in Oswego (laboratory).

Diagram drawn to show the altitude of the North Star to an observer on every tenth parallel of north latitude (laboratory).

F. Geographic Location.

1. Latitude: definition, use, determined by altitude of north star. Increase in length of degrees towards the poles.
2. Longitude: definition, use, prime meridian. Determination of longitude by chronometer, by telegraph.
 - a. Meridian established by means of noon shadows (laboratory).

Decrease in length of degrees towards the poles.

G. Time: Gregorian calendar and Julian calendar discussed. Civil day, conventional day, and standard time in the United States discussed.

H. Magnetism.

1. The earth a magnet. Theory to account for magnetism of earth.
2. Magnetic poles, equator, meridians, isogonic, agonic, isoclinic lines.
3. Mariner's compass.
4. Geographic north determined by noon shadow, magnetic north by mariner's compass. By means of protractor determine the magnetic variation at Oswego (laboratory).

I. Map reading and map projection.

1. Mercator's projection of parallels and meridians. Continents and principal islands sketched in from a globe (laboratory).
2. Orthographic polar projection of the northern hemisphere. Great bodies of land sketched in from a globe (laboratory).

II. The Gaseous Envelope—Definition.

A. Atmosphere.

1. Origin according to the nebular and planetesimal theories.
2. Function of the atmosphere as a whole.

B. Composition of the atmosphere.

1. Oxygen.
 - a. Origin; b. Relative abundance; c. Density; d. Function.
 2. Nitrogen.
 - a. Origin; b. Relative abundance; c. Density; d. Function.
 3. Carbon dioxid.
 - a. Origin; b. Relative abundance; c. Density; d. Function.
 4. Water vapor.
 - a. Origin; b. Relative abundance; c. Density; d. Function.
 5. Dust—inorganic and organic.
 - a. Origin; b. Function.
 6. "Precious" gases (argon, krypton, helium).
- C. Temperature—degree of heat.
1. Measurement of temperature.
 - a. Thermometer—kinds, construction, uses.
 2. Heat.
 - a. Sources.
 3. Various elements affecting temperature.
 4. Isotherms. Isothermal charts studied. Heat equator, cold pole.
 5. Thermograph.
 6. Heat belts—their areas and boundaries by isotherms.
- D. Pressure and density.
1. Relation of pressure to density.
 2. Relation of density to temperature.
 3. Density diminished by diminished gravity, by increased temperature, and by increased amount of water vapor.
 4. Measurement of pressure.
 - a. Mercurial barometer studied.
 - b. Aneroid barometer explained.
 - c. Mercurial and aneroid barometers compared—when each may be used to advantage.
 - d. "Falling" barometer may be due to increased temperature, increased amount of water vapor, or to increased altitude.
 - e. Altitude measured by barometer.
 - f. Isobars. Isobaric charts studied.

- g. "Highs" and "lows" on weather maps considered.
- h. Construction of a simple Mercurial barometer to illustrate how the column of mercury is sustained, Torricelli's vacuum (laboratory).
- i. Barograph—construction—use.
- E. Movements of air—currents.
 - 1. In vertical plane.
 - a. Upward—rare air.
 - b. Downward—dense air.
 - 2. In horizontal plane—wind.
 - 3. Origin of currents—unequal density of adjacent masses.
 - 4. Classification of winds.
 - a. Planetary (origin, location, direction, character).
 - (1) Trades.
 - (2) Antitrades.
 - (3) Circumpolar whirls.
 - (4) Migration of wind belts.Planetary winds charted on map of the world—globular projection. Calm belts located (laboratory).
 - b. Cyclonic winds: Origin, location, effects on life.
 - (1) Cyclones.
 - (2) Anticyclones.Daily weather maps studied and constructed (laboratory). Weather Bureau visited. Classes addressed by the Observer in charge of the bureau.
 - c. Tropical hurricanes: Origin, path, effect on life.
 - d. Western tornadoes: Origin, limitations, effect on life.
 - e. Diurnal winds.
 - (1) Land and sea breezes.
Land and lake (Ontario) breezes frequently noted in summer.
 - (2) Mountain and valley breezes.
 - f. Seasonal winds—monsoons.
 - 5. Deflection of winds—Ferrel's Law.
 - 6. Velocity—measured by anemometer.
 - 7. Classification of winds based on velocity.
- F. Humidity—measured by hygrometer.
 - 1. Absolute and relative.

Dew-point—illustrated.

2. Condensation.

a. Causes.

b. Forms.

(1) Clouds—distinguished and classified.

(2) Fog.

(3) Dew, frost.

(4) Rain, snow, hail, sleet.

c. Distribution—unequal.

(1) Well-watered regions.

(2) Semi-arid regions.

(3) Arid regions.

III. The Aqueous Envelope—Definition.

A. The sea.

1. Origin according to the nebular and planetesimal theories.

2. Area—comparative, absolute.

3. Divisions made by great land masses—oceans.

a. Names; b. Location; c. Comparative sizes.

4. Functions of the ocean as a whole.

a. The source of moisture for the life of the land.

b. The great distributor and equalizer of heat.

c. The greatest natural boundary between nations—a great peace-preserver.

d. A natural highway connecting all peoples.

e. Great ocean routes sketched on Mercator's map of the world (laboratory).

5. Composition—not uniform. Varies—

a. At mouths of great rivers.

b. In region of melting icebergs.

c. In belt of equatorial calms.

d. In trade wind belts—great evaporation without precipitation.

6. Density—varies with composition and temperature.

7. Explorations—soundings and dredgings.

a. By what means—how performed.

b. Results: changed notions regarding the temperature, light, and life of the ocean.

8. Depth: maximum and average. The great deeps located and charted.

9. Temperature.

- a. Sources of heat.
- b. Horizontal and vertical variations.
- 10. Light.
 - a. Sources.
 - On continental shelf. On deep sea bottom.
- 11. Movements of ocean waters.
 - a. Wind waves.
 - Causes; Movements; Parts; Effects.
 - b. Tidal waves.
 - Causes—attraction of moon and sun.
 - Kinds—flood, ebb, hence high and low.
 - Interval.
 - Changes in height due to modified attraction, giving rise to terms *spring* and *neap*.
 - "Slack water" explained.
 - Modifications of tidal waves.
 - (a) Bores.
 - (b) Races.
 - c. Seismic waves.
 - Wind-tidal and seismic-waves compared in height, length, duration, and effects on human interests.
 - d. Currents and drifts defined.
 - Origin; Location; Names; Deflection (Ferrel's Law); Central calms (Sargasso Sea); Effects on human interests.
 - e. Creep of ocean waters on ocean floor, from sub-polar areas towards sub-equatorial areas.
 - Evidence; Cause; Effect.
- 12. The ocean floor.
 - a. Relief—comparatively level, due to absence of weathering.
 - b. Origin and composition of materials.
 - On continental shelf.
 - In deep water.
 - In deepest waters.
 - Possible future of these materials resulting from successive uplifts of ocean floor, and their effects on human interests.
- 13. Marine life.
 - a. Plants—confined to continental shelf. Exception:

Sargassum. Plants cannot grow in depths beyond the reach of sunlight. Kinds and their use to man.

b. Animals—found in all waters, littoral, pelagic, abyssal. Kinds and their use to man.

c. Human industries determined by marine life.

B. Continental waters.

1. Rivers: Streams of water and rock waste flowing from higher to lower levels towards the sea. Sources of water and rock waste considered.

a. Parts of river: Source, banks, bed, mouth, tributaries.

b. River system: A river with all its tributaries.

c. River basin: All the land drained by a river and its tributaries. A river basin is a system of slopes.

d. Divides: Slopes meeting at their upper edges form water-partings, or divides; meeting at their lower edges form thalwegs.

e. Work of rivers: Earth side.

Drainage—effects on life.

Erosion—erosional changes noted.

Transportation.

Assorting power of running water.

Deposition—depositional forms noted.

f. Uses of rivers: human side.

Water power: to turn mill-wheels, to float logs in lumber regions; Transportation; Water supply; Fishing grounds; Natural harbors; Pleasure and health resorts.

g. A stream studied. (Field lesson.)

h. Natural career of rivers.

(1) Youth: Characterized by falls, rapids, lakes, islands, V-shaped valleys.

Note.—From a study of what a river is, also of the river's work, it will be evident that falls migrate up-stream, rapids fade out, lakes shallow and finally fill up, islands migrate down-stream, and the valley sides recede and diminish in slope. Study Echo Cliffs, Ariz., topographic sheet (laboratory).

(2) Maturity: Characterized by a more uniform and gentle flow, lower banks, larger number of tribu-

taries, migration of divides, greater area of basin, bed nearer to baselevel, increased tendency to meander, greater adaptability for commerce. Study Charleston, W. Va., topographic sheet (laboratory).

- (3) Old age: Characterized by fewer tributaries, greatly reduced vertical distance between source and mouth, a large area of flood plains, extension of delta, and weak relief of basin. Study Caldwell, Kan. topographic sheet (laboratory).

i. Tragedies in the life history of rivers.

- (1) Drowning, caused by sinking of a portion of the valley. The lower Susquehanna is a type. Results: A long, narrow bay, a shortening of the river, dismemberment of lower tributaries (making them independent rivers flowing into the young bay, the upper portion of which is called the estuary of the trunk stream).

- (2) Uplift and deltification. The lower Mississippi is a type.

Results: Extinction of a long, narrow bay, a lengthening of the river, engrafting lower tributaries (thus enlarging the river system and increasing the area of the river basin).

Note.—Uplift sometimes undoes the work of a river, causing it to begin anew, thus rejuvenating it. The Missouri in Montana is a type. Results: River terraces, falls, rapids.

- (3) Beheading, caused by migrating divides. The Chattahoochee, beheaded by the Savannah, is a type.

- (4) Change of climate, from moist to arid, producing wadies, salinas, salt lakes, playas; change of climate from warm to glacial, producing extinction of rivers by ice-sheet.

2. Lakes: bodies of water lying in hollows of the land.

Origin of hollows considered.

- a. Parts of a lake: shore, foot, head, bed, tributaries (outlet, inlets).

- b. Lake basin: all the land drained into the lake.

- c. Uses of lakes: A drainage reservoir, an equalizer of the flow of rivers flowing from them, promoters of navigation, modifiers of climate, food supply, pleasure and health resorts.
 - d. Destruction of lakes:
 - Drainage: Caused by the cutting down of outlet.
 - Filling-in: Caused by deposition of silt from inlets, wave erosion, wind-blown materials, evaporation, successive generations of plants and animals.
 - A lake and an obsolete bay studied (field lessons).
 - e. Life in rivers and lakes compared with life in ocean.
 - f. The relation of lakes to swamps and of swamps to meadows noted in special cases, and deductions made.
3. Underground waters: Streams and reservoirs.
- a. Origin: Ground waters, water held in suspension by the ground.
 - b. Ground-water level: Varies with weather and climate.
 - c. Destructive work: Chemical and mechanical erosion: strongly marked in limestone strata and salt deposits. Results: caverns, sinks or swallow-holes. Noted in any limestone region.
 - d. Constructive work: Deposits of metals and minerals in veins, of stalactites and stalagmites in caverns, and mineral matter sometimes on reappearing as surface waters.
 - e. Life in underground waters. Adaptation to peculiar environment.
4. Springs (cold, warm, hot, mineral, weak in action, gushing) and wells (ordinary and artesian).
5. Glaciers.
- a. Kinds: Continental (Ice sheets), Alpine.
 - b. Present and former ice sheets.
 - c. Formation: manner and needed conditions.
 - d. Movement: causes, rate. Advance and reasons for; recession and reasons for.
 - e. Moraines; source, classification.
 - f. Work: erosion, transportation, deposition (various forms resulting).
 - g. Disposal: melting (sources of rivers), breaking up into icebergs.
 - h. Glaciers and rivers compared and contrasted.

- i. Stereopticon views (lecture room).
 - j. Field lesson in which glacial mantle-rock, boulders of transportation (often polished and scratched on one side), grooved and striated bed-rock, drumlins, clay beds, and a small glacial lake are studied.
Study Sun Prairie, Wis. topographic sheet (laboratory).
- IV. The Rock Envelope: Definition.
- A. The Land.
 - 1. Origin according to the nebular and planetesimal theories.
 - 2. Area: comparative, absolute.
 - 3. Divisions of great land masses—continents.
Names; Location; Comparative sizes.
 - 4. Functions of the land as a whole.
 - a. To furnish conditions most favorable for the development of the highest forms of life; plant, animal, and human.
 - B. The structure of the land.
 - 1. The centrosphere: the central, and much the largest mass of the earth. Density very great; temperature very high. Inaccessible to man.
 - 2. The lithosphere: the solid crust of the earth, forming the land masses and sea bottom. It is made up of bed-rock, mantle-rock, and (covering much of the land masses) soil.
 - a. Bed-rock.
 - (1) Igneous rock.
Plutonic; granite, syenite.
Volcanic: basalt, trap, obsidian, pumice.
 - (2) Aqueous rock.
Shale; Sandstone; Conglomerate; Limestone; Bituminous coal.
 - (3) Metamorphic Rock.
Slate; Quartzite; Marble; Anthracite coal; Gneiss; Mica schist.
 - b. Mantle-rock: Definition, origin.
Clay; Sand; Gravel; Marl; Peat.
Rocks studied to secure ready identification. Ores of important economic value studied (laboratory).
 - c. Soil (covering much of the mantle-rock): Rock waste mixed with decayed organic matter.

Clayey; Sandy; Gravelly; Marly; Peaty; Loamy (light and heavy).

Study different kinds of soil to learn their origin, their composition, their relative capacity to receive and retain heat and moisture, hence their adaptability for the leading crops of agriculture (laboratory).

C. The Topography of the Land due to,—

1. Diastrophism: Forces which tend to upheave the region and thus increase its elevation.
 - a. Forces acting in a vertical plane, causing broad uplifts or depressions of areas (epeirogeny).
 - b. Forces acting in a horizontal plane, causing relatively narrow uplifts (orogeny).
2. Vulcanism.
 - a. Probable causes.
 - b. Volcano.
 - Cone (ash, lava, ash and lava).
 - Crater, caldera.
 - Eruptions: phenomena, products.
 - c. Classification of volcanoes: active, dormant, extinct.
 - d. Volcanic sheets, necks, dikes.
 - e. Distribution of active volcanoes.
 - Study Mount Shasta, Cal., Tarrytown, N. Y., Crater Lake, Ore., topographic sheets (laboratory).
3. Erosion, transportation, deposition.
 - a. Causes: chemism, moisture, change in temperature, wind, wave, current, stream, gravity, plant and animal life.
 - b. Results: Increasing the strength of relief to maturity, then decreasing that strength to old age.

D. Forms of relief.

1. Plains: Regions of slight elevation, fairly smooth surface, fine surface material, and relatively horizontal strata.
 - a. Coastal plain: uplifted continental shelf.
 - (1) Narrow: The coastal plain of Mexico bordering the Gulf, an example.
 - Study its relief, drainage, shore-line, and its relation to human activities.
 - (2) Broad: The Atlantic Coastal Plain of the United States, an example. This plain is divided into

three belts on the basis of height, drainage, and soil.

Study the adaptability of each belt to human settlement.

Study Glassboro, N. J., topographic sheet (laboratory).

- (3) Embayed: Drowning of former marginal land. The coastal plain from Delaware Bay to Pamlico Sound is an example. Study its relation to agriculture, fisheries, and commerce.
- b. Alluvial plain. Origin: Successive river deposits during overflows. The Alluvial plains of the Mississippi are notable examples. Note that the direction of their slope is at right angles to the river banks, producing high front lands, and swampy back lands. Consider their fitness for agriculture, for human health and safety. Study maps of the Alluvial Valley of the Mississippi River published by the Mississippi River Commission, St. Louis, Mo. (laboratory).
- c. Lacustrine plain. Filled and drained lake basins. The Red River-of-the-North "valley" is an example. Study its conditions for tillage and settlement. Study Fargo, N. Dak., topographic sheet (laboratory).
- d. Plains by denudation: Peneplains.
 - (1) Worn-down mountain regions.

The Piedmont plain of Virginia, between the Blue Ridge and the coastal plain, is an example. Surface gently rolling, soil deep, fine, fertile. Fitted for grazing, agriculture, and human settlement. The remnants of the old mountains are called monadnocks.
 - (2) Worn-down plateau regions.

The plains of Western New Mexico are examples. The remnants of the old plateau are called either mesas or buttes.
2. Plateaus: Regions of high elevation, relatively horizontal strata. Surface material somewhat coarser than that of plains, bounded by a more or less abrupt descent to lower ground or in part by mountain ranges. An extensive plateau may be crossed by mountain ranges or deep valleys.

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- a. **Young Plateaus:** Characterized by deep and narrow stream valleys (canyons). The Colorado Plateau in northern Arizona is an example. Not favorable for human activities.
Study Echo Cliffs, Ariz., topographic sheet (laboratory).
 - b. **Mature Plateaus:** Characterized by hill-and-valley surface. Drainage fairly well established. Many waterfalls in lateral valleys. The Allegheny plateau is an example.
Conditions favor native plants and animals, and the more primitive occupations of man, as hunting, fishing, and grazing, although lumbering and mining are often engaged in. Conditions do not favor a dense population. Study Charleston, W. Va., topographic sheet (laboratory).
 - c. **Old Plateaus:** Characterized by shallow, flat-bottomed, and wide stream valleys, occupying much of the surface. Remnants of the strata, called mesas when large, buttes when small, are found here and there.
The plains of western New Mexico and eastern Arizona are examples. Favorable for human occupation when sufficient moisture may be secured.
Study Abilene, Tex., topographic sheet (laboratory).
 - d. **Broken plateaus:** A series of related plateau blocks separated by fractures commonly known as faults. These vary in height, but retain their strata in a horizontal plane. Conditions not favorable for human settlement. The Colorado plateau is an example.
Study Kaibab, Ariz., topographic sheet (laboratory).
3. **Mountains:** Results of orogeny and vulcanism.
 - a. **Block:** Due to faulting, uplift, and tilting; analogous to broken plateaus, although plateau blocks retain their strata in a horizontal plane. Characterized when young by one long gentle slope and one short abrupt slope. As they develop the slopes gully and ravine contribute their waste in fan-like deposits at their base. Earthquakes are frequent. Study young block mountains in southern Oregon, mature block mountains in

central Nevada, and old block mountains in southern California.

Study Alturas, Cal., topographic sheet (laboratory).

- b. **Domed:** A broad arch or open fold, due to bending of strata from lateral pressure or to the intrusion of igneous rock between sedimentary beds, forming a peculiar bulging of the overlying strata. The Black Hills are an example. Study Black Hills and Henry Mountains topographic sheets (laboratory).

- c. **Folded:** Probably due to lateral pressure producing anticlines and synclines, anticlinal valleys and synclinal ridges. The Jura mountains are a good example of young folded mountains.

Study Harrisburg, Pa., topographic sheet (laboratory).

- d. **Lofty:** Complex in structure; evidences of repeated tilting in blocks, uplifting in domes, and pressing into folds. The Alps are an example.

Study Canyon City, Col., topographic sheet (laboratory).

Note.—In the study of mountains consider their life history. Their youth is characterized by steep slopes, land-slides, avalanches, earthquakes, comparatively even sky-line, absence of deeply eroded gullies and large talus slopes.

Their maturity is noted in lowered peaks, rounded summits, uneven sky-line, broad ravines containing well established streams, deep accumulations of detritus.

Old age is marked by broad valleys with low water-partings, a thick covering of fine rock waste, monadnocks (remnant mountains), and absence of bare ledges. Example: The Piedmont belt of Virginia.

As mountains advance in age their conditions for human occupancy are more and more favorable.

Mountains often determine the climate of adjoining regions, separate flora and fauna belts, are sources of many rivers, of mineral wealth and timber supply, and are scenic centers and health resorts.

E. Shore lines.

1. Definition.
2. Regular shore line, resulting from,—

- a. Retrogression of the sea, due to continental uplift.
- b. By the formation of sand reefs, and the filling-in of lagoons and inlets.
- c. By delatification.
3. Other results of a. b. c.: Lengthening of rivers, engratting of shallow streams, formation of coastal plains.
Study Atlantic City topographic sheet (laboratory).
4. Irregular shore line, resulting from,—
 - a. Advance of the sea, due to continental sinking.
Study Boothbay, Me., topographic sheet (laboratory).
5. Other results of continental sinking: Shortening of rivers, dismemberment of affluents (forming independent streams), formation of drowned valleys (estuaries), islands, peninsulas and promontories. An irregular coast-line favors commerce. A regular coast-line is inhospitable in time of storm.

(To be Continued)

THE FAMINE IN JAPAN

RECENT information which has reached us about the famine in the northern provinces of Japan shows that the calamity is the greatest that has happened to that section of the country for the last sixty years. So appalling are the conditions that the committee chosen by the foreign community of Sendai declare that out of a population of 899,279 at least 280,000 people are in extreme distress, "with no possibility of saving life without aid." Three provinces are involved in the distress—those of Miyagi, Fukushima, and Iwate. The immediate cause of the famine is the failure of the rice crop; and how complete this failure has been is shown by the fact that in Miyagi alone the yield of rice this year is less than twelve per cent. of the normal amount. One of the newspapers in this province says: "The sentence of death has been passed on the people of this province"; and the statements of the committee are so worded as to show that there is little exaggeration in this pitiful declaration. In Fukushima some 300,000 people are already in distress, and in Iwate, the least afflicted of the three provinces, it is said to be certain that 100,000 people cannot live without speedy and continued aid. Throughout the famine-stricken territory many thousands of men, women, and children, have been reduced to eating the bark of trees, shrubs, and roots.—*The Outlook*.

THE FUNDAMENTAL AND THE INCIDENTAL IN GEOGRAPHY*

BY R. H. WHITBECK,
State Model School, Trenton, N. J.

THE subject matter of geography is almost limitless in amount. It is neither possible nor desirable to teach it all; a selection of material must be made. Of the matter selected to be taught, some is much more important than the rest. Some is fundamental; some is merely incidental. Exact agreement upon what is fundamental is not possible.

Geography belongs among those studies in which subject matter is the primary aim, and mental discipline is secondary. The study of geography will afford mental discipline. You can't help it. But in selecting what shall be emphasized, the guiding question, in my judgment, must be, "What parts of all this geographical material are most *useful* to the average person?"

There is a body of knowledge that ought to be a part of the life equipment of every intelligent man, and which it is the duty of geographical study to supply. No other study can be held responsible for furnishing this kind of intelligence. The vast majority of the children are to be the world's workers. They will not become learned men. My conviction is, then, that up to the end of the sixth school year, geography teaching should emphasize those things that are most likely to prove useful, later, to the rank and file of men; that the teaching should be strongly utilitarian; eminently sensible. To be more explicit: up to the end of the sixth school year, I believe map studies are fundamental, but I would not have the maps crowded with names,—a condition that complicates them and tends to leave in the mind indistinct pictures. There is value in simplified maps, studied and sketched, so that they fix themselves as permanent pictures in the mind. Upon those maps, only names which figure prominently and frequently in the reports of the world's affairs should appear. I have asked educated people to name the mountain ranges of South America. Most of these people, and they were well-read people too, could name just one range—the Andes. They could name five or six cities and about three rivers and possibly a half dozen important exports from South America to the United States. They had also a general idea that we sell manufactured goods to the South American states. Why do these people know so little about South America? They doubtless once learned in school the names of a dozen rivers, a half dozen mountain ranges, and a score or more of cities. It is simply because these

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geographical names figure so little in the affairs that interest the average man that they have forgotten them because of their sheer worthlessness.

A multitude of cities are mentioned and mapped in our school geographies. One modern text-book mentions 201 foreign cities which it calls "principal cities." Another gives 175 outside the United States, and 175 in the United States, and modestly heads the list "Some important cities." Still another book gives 275 cities in the United States and 310 foreign cities, or nearly 600 in all.

One of the new school geographies crowds its maps with place names. For example, it prints the names of 190 cities and towns on a map of France 3 by 4 inches in size. Not over ten of these are of much consequence to the average person.

Partly from interest in the experiment, and partly for the sake of any value that might come from the results of the effort, I undertook a little task in the Cornell Summer School of Geography of 1904. There were present some seventy-five geography teachers, principals, and superintendents, from twenty or more states; they represented all kinds of schools. These teachers were divided into committees, and each committee was asked to decide upon what cities in the continent assigned to it are of primary importance; cities that are so important that an American school teacher should teach their location rather accurately; teach why they are important, and for what they stand in world affairs. It was agreed that a city must stand for more than one important thing in order to be included in the list. Lyons, for example, though it is the leading silk-making city of the world, presents nothing else that an American school boy need know, and hence would not be included. The committees decided upon the lists of cities and passed them over to a committee of the faculty of geography. These men were Prof. Ralph S. Tarr of Cornell, Prof. Albert P. Brigham of Colgate University, Prof. Charles A. McMurry, the well known writer and lecturer on pedagogy, and instructors Philip Emerson of Lynn, Mass., Geo. A. Hubbard of Cornell, and Ray H. Whitbeck of Trenton, N. J. Two-thirds of the cities listed by the first committees failed of approval by the faculty committee. Any city in the United States which received two or more of the six faculty votes was listed. Following is the list; the numeral after a name signifies how many of the six votes this city received:

New York (6)
Chicago (6)
Philadelphia (6)
St. Louis (6)
Boston (6)
Baltimore (2)

Milwaukee (2)
Washington (6)
Denver (6)
Louisville (2)
Minneapolis-St. Paul (6)
Kansas City (2)

Cleveland (3)	Indianapolis (2)
Buffalo (3)	Duluth-Superior (5)
Pittsburg (6)	Salt Lake City (3)
San Francisco (6)	Puget Sound cities (4)
Cincinnati (2)	Scranton-Wilkes-Barré (3)
New Orleans (6)	Galveston (4)
	Lowell (3)
	(25)

No foreign city was listed unless it received the approval of at least three of the six members of the faculty. Following are the lists:

Europe

London (6)
 Liverpool-Manchester (6)
 Edinburgh (6)
 Glasgow (6)
 Madrid (4)
 Berlin (6)
 Hamburg (6)
 Vienna (4)
 Rome (6)
 Naples (3)
 Athens (6)
 Constantinople (6)
 St. Petersburg (6)
 Paris (6)
 Marseilles (3)
 Venice (4)
 (16)

Asia

Bombay (6)
 Calcutta (6)
 Canton (5)
 Peking-Tien-Tsin (6)
 Hong Kong (5)
 Jerusalem (6)
 Tokio-Yokohama (6)
 Mecca-Medina (3)
 (8)

Western Continent

Exclusive of U. S.

Montreal (6)
 Quebec (5)
 Rio Janeiro (6)
 Buenos Aires (6)
 Havana (6)
 Mexico (6)
 (6)

*Africa, Australia,
 and Scattered Islands.*

Cairo (5)
 Cape Town (5)
 Johannesburg (3)
 Melbourne (4)
 Sydney (3)
 Manila (6)
 Batavia (3)
 Honolulu (6)
 (8)

It is worthy of note that, while the text-books in geography mention upwards of 100 cities in Europe, only sixteen are regarded by this committee as deserving of emphasis and only eleven received the endorsement of the whole committee. The entire list contains only 57 cities; only 34 received the votes of the entire committee. It is understood, of course, that this

committee would expect pupils to be familiar with the names and approximate locations of probably twice as many more cities.

I took a list of 175 foreign cities, called in a modern school geography "Important," and pronounced them to various people who were kind enough to let me experiment upon them. A normal school senior just about to graduate with good standing could locate 30 per cent. of them, that is, could tell in what country they are found. A woman of educated tastes, a former school teacher, could locate 26 per cent. of them. A Princeton graduate with an A. B. (1903), now a teacher, succeeded in locating one-half of them.

Such an experiment may not prove anything, but it does suggest that more than half of these "important" cities do not figure enough in the reading of even well-educated people, so that these people can tell in what country they are located, much less tell anything more about them.

There is no authority able to dictate just what is fundamental and just what incidental. The individual teacher, supervisor, or superintendent must judge for himself. It is not all important that we agree upon just what is fundamental; it is of consequence that each teacher shall decide *what she will consider as fundamental* and then teach it so that it will stick. The amount of matter that will stand the test and prove itself to be fundamental is not great. The incidental matter is limitless, but such matter is not to be emphasized. Most of it will be forgotten, as it ought to be. A residuum will remain in the memory. Its survival will be the test of its fitness. *Its value will lie in its having been known.* There are only a dozen mountain ranges outside of the United States that need be remembered. About three rivers in South America, six in Europe, three in Africa, and six in Asia call for emphasis. A half dozen mountain peaks and as many capes outside of North America will prove, in life, to be worth remembering. Many other rivers, mountains, and capes will cross the path of the geography pupil in his study. He will, for the time, be on speaking terms with them. That is sufficient. They are only incidental. Long lists of exports, imports, and manufactures are mostly "lumber." We import a thousand kinds of merchandise, raw and manufactured. A few of these are really worth emphasizing, and only a few. Certain foreign places supply us with important articles; *e. g.*, rubber, tea, coffee, sugar, raw silk, wool, hemp, cocoa, hides, spices. Certain countries have specialized in certain manufactures, and excel in these lines; *e. g.*, English suitings and cutlery, French pottery and artistic fabrics, Bohemian and Venetian glass, Irish linen. In this matter of imports and exports there is need that teachers use the pruning knife and use it freely.

It was in the endless lists of places, rivers, islands, capitals, exports, imports, etc., that the old geography went astray. The new geography temporarily went astray in quite a different direction. It swung away to the other extreme; neglected political and commercial matters, and laid an absurd emphasis upon physiography. There were pages about primary highlands and secondary highlands; primary lowlands and secondary lowlands. It was dry stuff, and teachers and pupils soon rebelled against it; a saner geography is now with us. The physiographic basis of geography is right. I can not conceive of rational geography that is not based upon physiography; yet a sense of proportion must be maintained.

I have held that geography, up to the end of the sixth year, should aim primarily to give information useful to the rank and file of men. Beyond the sixth year, the controlling purpose will change. Facts for their own sake will receive less attention; general principles of geography, the idea of cause and effect—the “why”—will come into the foreground. They should have been present in all of the teaching; now they receive the emphasis. The judgment is called into service more, the memory less. This is as it should be. The early grades are the place to store the memory with facts, providing they are facts of value. The reasoning powers develop later.

Geography teaching should run through the grammar school course. Certain topics like the earth's movements and the results thereof, the effects of the inclination of the earth's axis; the light zones, the heat zones, the wind belts, call for accurate reasoning. They cannot be economically taught to immature minds. They probably ought to be taught in the grades; I sometimes doubt it. But certainly they should be left until the last year. I am aware that few courses of study conform to this notion. I question if the phenomena of the tides beyond the simplest facts, should be taught at all in the grades, particularly the cause of the tide on the side of the earth opposite the moon. I rarely find a teacher who understands this phenomenon, to say nothing of teaching it.

There are general principles of geography, just as there are of physics or chemistry. Some of them fall within the comprehension of grade pupils. These general principles, causes, consequences, and relations, are fundamental to later geography.

A few examples will illustrate the meaning of geographic principles:

1 The higher men rise in civilization, the more varied and numerous are their wants.

2 To gain profit from supplying these varied wants, men engage in farming, mining, fishing lumbering, and all other forms of production, and in manufacturing and trading.

3 Because of differences in climate, soil, location, people, etc., different regions

are fitted to produce different things, and the exchange of these commodities forms commerce.

Living is easiest in a warm climate and hardest in a cold climate, but a temperate climate is most favorable to progress.

People are found in greatest numbers in regions of rich soil and easy travel, hence the rich valleys are most thickly populated.

Forests grow only where there is ample rain. General farming requires considerable rainfall or irrigation. Grazing is the chief industry in lands of small rainfall. (Mining?).

To make an industry profitable, men must be able to sell their products and deliver them where they are desired; hence means of transportation are demanded.

Where transportation facilities are best, all kinds of industries are most thriving.

Valleys and plains are natural routes for canals and railroads.

Manufacturing is especially dependent upon transportation, hence manufacturing and commercial cities grow up on navigable waters and at railroad centers.

A good climate, a good harbor, several lines of railroad, river or lake transportation, water power, nearness to coal mines, a rich surrounding country are the leading advantages of location.

A rising coast tends to produce an even shore line, without harbors. A sinking coast drowns the river mouths and produces harbors. Nearly all the good natural harbors of the world have resulted from the sinking of the land.

Geographical relations are fundamental matters, their importance increasing with the maturity of the pupil. For example, the great slaughtering and meat packing industry of Chicago, Kansas City and St. Louis, is a consequence of the corn fields of the Middle Western States and the grazing lands farther west. Corn is a response to the climate and soil of these states, and grazing is always the industry in regions of limited rainfall. The small rainfall of the grazing states results from their position on the leeward side of a mountain range. Hence, there appears the chain of relations between prevailing winds, mountains, rainfall, grazing, and slaughtering. These are cause-and-effect relations, and are easily perceived.

Again, Great Britain has coal and iron. They invite manufacturing. She is an island with many harbors. This develops seamanship. She desires to sell her manufactures and to secure food for her millions of workmen. This suggests colonies and Great Britain becomes the great colonial empire. Commerce requires ships, and she builds the greatest merchant marine in the world. A merchant marine and a colonial empire demand a navy to protect the commerce and the colonies, and Great Britain, of necessity, has the largest navy in the world. There is a close and evident relationship existing here, as there is among the larger facts in the geography of every country.

If my analysis is right, seventh and eighth year geography will lay the emphasis upon geographical influences and relations, geographical causes and

effects. Facts must still form a major part of the work, but the facts are made incidental to the geographical relations which are to be brought out. The earlier geography work was utilitarian. The later is educational or disciplinary to a larger extent.

The earlier teaching should be made definite by the teacher's selecting and listing the facts which she purposes to emphasize, and then seeing to it that the pupils appreciate that there is a difference between primary and secondary material.

The teaching of relations is harder to make definite. It is always easy to be indefinite. It is the expert teacher who can select from a maze of matter the salient points, emboss these points upon the background of her teaching so that they stand out like headlines; and when the details have all dwindled away in the distance, the essentials still stand out and refuse to be forgotten, because they were emphasized in a way that distinctly separated them from the thousand and one merely incidental facts of geography.

I have said nothing about field work. Without question, it is one of the most valuable means of teaching some phases of geography. Said Sir Archibald Geikie, the leading English geographer, "One hour's instruction in the field is, in fact, worth twenty hours of reading or listening to lectures." Said Colonel Parker, "Field lessons are an indispensable means in teaching geography." Practically every recognized leader in geography in America has committed himself to the same view. I shall not discuss the matter here. Suffice it to say that field lessons cost a good deal of planning, inconvenience, and strength, but they are worth what they cost.

To summarize:

Efficient geography teaching requires that as sharp a distinction as possible be made between matters that are really worth remembering and those that are not.

Memorizing facts is perfectly legitimate if the facts are worth memorizing.

Up to the end of the sixth year, the probable *usefulness* of material should be the test of what to emphasize in teaching.

The studying and sketching of maps to the end that clear mental pictures of these maps may be formed, is a fundamental exercise, especially in the 4th, 5th, and 6th years. Clear and simple maps are needed for school study.

Carefully selected lists of cities, rivers, mountains, exports, manufactures, etc., should be made and only the relatively few important ones should receive emphasis. Experience in life shows that these lists may be short without loss.

No authority can say exactly what is or is not fundamental. The important thing is that the teacher discriminate as wisely as she can, and lay the emphasis accordingly.

Many of the facts of mathematical geography are too difficult for immature minds and it is economy to teach them late in the course.

The earlier years of geography are the memory years: the later are the reasoning years.

In the seventh and eighth years, geographical relations and geographic-
al principles should receive the emphasis.

Field work comes high, but it is worth all it costs.

There is a striking passage in Bagley's "The Educative Process." I want to put the word "geography" in place of his word "education" and quote the passage as my conclusion:

"What we need in geography (education) is something definite to tie to. If this something be accurate and exact, so much the better; if it can not be accurate and exact, let it approach this ideal as closely as possible, but in any case let it be definite."

WHITE MISTS AND BLACK CLOUDS.—Bouguer, of the expedition sent to Quito by the French Academy to measure a degree of latitude near the equator in 1736, wrote the following:—

P. xliii. "All the time we were crossing these mountains we couldn't help seeing the great error of the physicists who think clouds are not the same as mists. Often the clouds were five or six hundred fathoms below us and prevented us from seeing the earth, while they hid the sky from the inhabitants of the plains. At other times these clouds mounted higher and became a simple mist in which we were. When I have seen them well below us they always looked very white; I can only compare their form and color to masses of cotton that touched each other and had a wavy surface. As for the color, the same thing happens with water as with glass. It is well known that glass loses its transparency when pulverized and looks snow white from the side where it is strongly lighted. It is the same with water when reduced to very small particles or almost imperceptible drops in clouds or mist

"As the (drops) . . . present too many tiny surfaces to the light they seem dark when looked at from below, while if the spectator is placed above as we were often on Pinchincha and other mountains, all the rays reflected and intermingled after having suffered several refractions, form white in accordance with what we know of the nature of light."

M. S. W. J.



ular idea that the hills were thrown up above the present land surface by volcanic eruption is incorrect. The common impression that the central basins already referred to are the original volcanic craters is also an erroneous one. The craters, where any existed, were hundreds, perhaps thousands of feet above the present surface and all traces have been completely removed. Remnants of sedimentary beds are still found adhering to the igneous rocks high up on these hills, thus evidencing their residual origin, and attesting to the enormous erosion of the district.

Besides indicating this great amount of erosion they also record the high water marks of the period of submergence which this part of the continent suffered near the close of the ice age. During that period the water stood for some time at various heights, cutting on these hills a series of beach terraces, many of which are still well preserved. A beautiful one on the south side of St. Bruno mountain can be well seen by the traveler on the Grand Trunk Railway from Portland to Montreal between Beloeil and St. Bruno stations. On Mount Royal these terraces have given the direction to many of the principal streets of the city of Montreal. Thus St. Antoine, Dorchester, St. Catharine and Sherbrooke streets represent different water levels of this prehistoric sea, which at its greatest height possibly covered the entire mountain.

Among other examples of physiographic control afforded by the Monteregian hills are the magnificent apple orchards which flourish upon these mountains probably supported by the peculiar enrichment of the soil due to the decay of the alkali-rich volcanic rocks. Also the oak tree, which is rare in other parts of the district, here finding drainage and other conditions suitable to its growth, becomes quite common. Thus Brome mountain has one elevation known as "Oak Hill," while on Mount Royal the oak is probably the most abundant tree in the natural park which has been reserved by the city of Montreal upon the mountain top.

The different hardness and texture of the rock in different parts of these hills gives them an uneven surface, and, consequently, an incomplete drainage. A principal feature of this is the number of small ponds or lakes which are thus formed. Brome mountain has three small lakes; Shefford, one; Yamaska, two; Rougemont, two; Beloeil, one; and St. Bruno, no less than five. Owing to their elevation these lakes commonly supply water to neighboring towns in the plains and are generally the source of the ice supply. They also afford admirable summer resorts in many instances, and in a few cases have lately been well stocked with fish.

These and other features of the Monteregian hills should make them especially useful for local observation and study in elementary physiography.

EDITORIAL

THE TEACHING OF REGIONAL GEOGRAPHY

IT is an interesting indication of the trend of thought in educational geography that at the recent meeting of the Association of American Geographers, a most lively discussion arose over a paper on Political Geography in Universities, in which the author appealed strongly for "good old-fashioned geography" as a necessary basis for effective college work in history, economics, sociology, or any other science that deals with the location of places and regions in the world.

It seemed to be the consensus of opinion that pupils are woefully ignorant of the ordinary necessary information about the world when they leave the secondary schools. If this is true on the part of students entering college where they can gain some knowledge of regional geography, even though it be irregularly and merely by chance, it must also be true of the vast majority of pupils who do not enter college. It certainly is more than unfortunate—it is shameful—that pupils are turned out of the secondary schools with no knowledge—certainly no organized knowledge—of the world in which they live. How can young men or women read the newspapers or the magazines intelligently, discuss current events in history or politics, read books of travel or even novels, unless they know something about the regional geography of the important countries of the world?

The placing of the responsibility for this condition is perfectly easy. It is not the fault of the earnest teachers in the elementary school, nor of the course of study in the lower grades, nor of the text-books in use in the schools. Teachers in elementary schools are generally considered responsible for most deficiencies in training on the part of youths leaving the high school. But school geography has never been as efficient or as strong as now.

There are two very strong reasons for the weakness in our educational work. In the first place geography in the elementary schools is coming more and more to be "completed" in the seventh grade. Thus five years elapse before the pupil leaves the high school, during which time any knowledge of regional geography is only gained as a by-product in the study of history, commercial or physical geography or other related subjects.

The ordinary high school work in geography is purely physical geography, or occasionally commercial geography. The place that physical geography has won in our secondary schools has been due to the untiring

efforts of college authorities who have advocated physical geography as a good secondary school science, which in many cases will be accepted as a college entrance subject. This sole emphasis of physical geography has meant the exclusion or neglect of the more useful and necessary regional geography. Therefore the present absence of regional geography from the secondary school is the chief cause for the ignorance of this subject on the part of high school graduates. And this neglect of the subject is due to the influence of the college authorities and the geographical leaders who have brought about the present secondary curriculum, though it should be said that the unfortunate neglect of regional geography was never foreseen by the leaders.

How can a pupil who is under the constant strain of keeping up his daily work in the secondary school be expected to carry along with him the geographical knowledge gained in the grades? We do not expect a pupil to do this in the other fundamental subjects. History, English and Mathematics are continued into or through the secondary schools, and no one would think of permitting any one of these subjects to be dropped finally four or five years before the pupil graduates from the high school.

Have we a right to make it practically necessary for a pupil to neglect one of the fundamental subjects in his training for the four or five most impressionable years of his life? If we require him to drop geography for so long a time have we a right to judge his ignorance severely, or to blame his teachers in the elementary school for not giving him as good a working knowledge of geography as he has of other subjects that he has studied perhaps continuously for eleven or twelve years?

Must we not face these conditions fairly and acknowledge that, in our zeal for improving the secondary curriculum, we have overlooked the practical needs of the pupils? Is it not time to enter a plea for geography for at least three years in the secondary school, part of which should be regional geography, and perhaps part of it definite courses in physical or commercial geography?

Regional geography well taught, can be made as strong scientifically, as thought provoking, as disciplinary, as well worthy of support by the colleges as physical geography can be. Regional geography deserves more attention in both high schools and colleges. Let us realize that the future good of pupils demands a better knowledge of regional geography than they now gain from most secondary schools and let us work to make that better knowledge possible.

The Editor will be glad to hear of high school courses in regional geography now being given and to receive outlines of such courses.

REVIEW

LIPPINCOTT'S NEW GAZETTEER OF THE WORLD.—Edited by Angelo Heilprin and Louis Heilprin, pp. x + 2053. J. B. Lippincott Company, Philadelphia and London, 1905.

THE new and rewritten edition of Lippincott's well-known gazetteer is really the old book only in form and in its system of pronunciation, as it has been completely revised so that but little of the old book is retained. The editors have had a difficult task and have done it well.

The text includes brief and accurate accounts of all the places that any one could well wish to know about, though a town like Adis Abeba or Ababa, as spelled by both Stieler and Andree, might not readily be found under Addis Abeba by any one using these two authoritative atlases.

We note also that the editors use Congo Free State for the Congo Independent State, as it is officially called. We may question the unusual spelling *beauxite* for the more common and preferred spelling of *bauxite*. To speak of a country seat as a capital is also not in accord with American usage. These usages are, however, of little importance to the casual user of the book, though they are points that ought to be considered by the editors when a new edition is planned.

On the other hand we find that the editors are careful and accurate in their use of terms like Rocky Mountains which is so generally misapplied. A similar test of other difficult points shows that the work is accurate and up-to-date, while it is impartial on controverted points.

It should further be noted that the references are by no means meager. A state, like Massachusetts for instance, receives two full pages devoted to a careful, well ordered digest of the geography of the state. Thus the book is a valuable source of reference not only for facts of location, spelling and pronunciation but for the thousand and one bits of information which any one interested in current events is constantly desiring to find out about quickly.

The book is printed on good light weight paper so that the weight of the volume is an extreme surprise. Hence it is handy, usable and convenient. It deserves wide usage in all places where such a reference volume is of value, and is a necessary addition to any geographical library, however small.

R. E. D.

RECENT PUBLICATIONS

THE ELEMENTS OF GEOLOGY. By William Harmon Norton, pp. x+461. Boston, Ginn & Co., 1905.

A new elementary geology characterized by clear descriptions, excellent exposition, well selected illustrations and planned so as to make pupils think. Divided into three parts—Internal Agencies, External Agencies and Historical Geology. The facts and principles of the earlier parts are referred to and applied wherever possible; thus necessitating the best kind of reviews by students.

(To be reviewed later.)

AN INTRODUCTION TO PRACTICAL GEOGRAPHY. By A. T. Simmons and Hugh Richardson; pp. viii+380; London, Macmillan & Co., 1905.

An excellent series of suggestions for practical work on maps, the Globe, Climate, Rivers, the Sea, Plant Geography and Man's Dwelling-Place. More than suggestive for any teacher of laboratory work in geography. (To be reviewed later.)

FISHING AND HUNTING. By Sarah M. Mott and Maude Barrows Dutton, pp. 127;

IN FIELD AND PASTURE. By Maude Barrows Dutton, pp. 190. Being Volumes I and II in Dutton's World at Work Series, New York, American Book Company, 1905.

These two little volumes are planned as supplementary reading in the second and third grades of school work where the curriculum centers about primitive life. The first volume treats of the hunting and fishing people as illustrated by the Eskimos, the American Plains Indian, in the Philippines and in Alaska. The second volume considers the agricultural and grazing people with two chapters devoted to the Pueblo and Navajo Indians.

The reading matter seems well adapted to the abilities of the grades for which intended, the text is in general interesting, the illustrations are well selected and are used effectively as the basis for the text materials.

Each volume is accompanied by brief suggestions as to hand work available for illustrative purposes. The books are excellent for the purpose for which they have been prepared, but a logical course in geography has no place for so many references to foreign countries before children have studied their home geography or know anything about the world.

HARRISON SERIES OF HISTORICAL AND GEOGRAPHICAL OUTLINE MAPS. William Beverley Harrison, 47 Broad St., New York City.

Harrison's new series of outline maps, covering several of the continents and principal countries, Ancient Rome, Ancient Greece, Palestine, etc., are now rapidly appearing. The maps are attractively printed on paper of note-book size and should prove valuable for work in history, geography and in current events. Latitude and Longitude lines are indicated but not numbered and the maps are minus any scale, their most serious defects.

PENINSULAS

A Peninsula, the dark sea wave entwines,

Save by some neck that to the main land joins.— *Old Definition.*

NOTES

MEXICO —Physical Features.—Size.—Its very size proclaims the future greatness of Mexico. Its area is 767,326 square miles, considerably more than one-fourth the area of the United States (exclusive of Alaska and islands) and nearly equal to the combined areas of Great Britain and Ireland, France, Germany and Austria-Hungary. The extent of this area may be realized by superposing it on the United States, when it would stretch from Tallahassee, Fla., to the North Carolina-Virginia boundary and westward to the Rocky Mountains near Helena, Mont. One glance at such a diagram suggests how diverse must be the conditions of production in the several portions of so widely extended a body of land. Its greatest length is 1,950 miles, its extreme width 750 miles, while its narrowest part, the Isthmus of Tehuantepec, is only 120 miles wide. Its coast line is 1,727 miles on the Atlantic and 4,574 miles on the Pacific.

Geographic Position.—Mexico extends over 18 degrees of latitude, namely, from $14^{\circ} 30' 42''$ to 32° north latitude and lies between $86^{\circ} 46' 8''$ and $117^{\circ} 7' 31''$ longitude west of Greenwich. Eighteen degrees of latitude (as far as from the south cape of Florida to Niagara Falls) imply a great variety of climates. Its southernmost point lies about 2 degrees more southerly than the southernmost part of Europe, and about $5\frac{1}{2}$ degrees south of the south coast of Cuba and on a parallel with Lake Tchad in Africa, Aden in Arabia and Madras in India. The Tropic of Cancer, passing a little to the north of Tampico and of the Zacatecas mines, divides Mexico into two almost equal halves. One half of the Republic, therefore, is tropical, the other subtropical.

Climate.—Latitude gives only a rude indication of climate. Other factors are altitude and wind direction, as the wind brings with it the temperature of other regions and has an essential influence on moisture.

To form an idea of Mexican climate, it may also be useful to compare the mean annual temperature of the City of Mexico (61.34°) (maximum 89° , minimum 35°) with the mean annual temperatures of the following cities:

CITIES	Mean Temp.	CITIES	Mean Temp.
Cincinnati	54°	Barcelona	61°
St. Louis	55	Nagasaki	61
San Francisco	56	Naples	61
Washington, D. C.	56	Athens, Greece	63
Madrid	56	Wilmington, N. C.	63
Bordeaux	57	Jerusalem	63
Marseille	57	Algiers	65
Norfolk	59	Charleston, S. C.	66
Florence, Italy	59	Montgomery, Ala	66
Rome, Italy	60	Savannah	67
Nashville	60	New Orleans	69
Lisbon	60	Manila	79

The difference in temperature between day and night is marked, while between summer and winter it is slight. Snow is unknown except on the highest peaks; the leaves do not fall in autumn, but, like those of our ever-greens, are constantly replaced.

From the early days of the Spanish period it has been customary to divide Mexico in point of temperature into three zones: The tierra caliente, or hot land; the tierra templada, or temperate land; and the tierra fria, or cold land. To these may be added the tierra helada, or frozen land. The contrast between the three zones is best exhibited on the main line of communication, that between Vera Cruz and the City of Mexico. The map shows that the tierra caliente, with its dense forests, its swamps and fevers, forms a narrow belt along the coast, while by far the greater part of the country belongs to the tierra templada.

As regards moisture, the northern part of Mexico, like our own West, is subject to the influence of the Japan current, which, having drenched the northern latitudes with moisture, inflicts on the more southerly lands the curse of aridity.

The variation in moisture, from 2 to 3 inches on the Arizona boundary to 156 inches and more on the Isthmus of Tehuantepec, is far greater than in the United States, where the maximum, 100 inches, occupies only a narrow strip along the coast of Oregon and Washington. The maximum of 156 inches is exceeded in very few regions of the globe (head of Bay of Bengal, Gulf of Guinea, Dutch East Indies, Philippines, Fiji Islands).

Surface Configuration.—The Isthmus of Tehuantepec forms the dividing line between two regions remarkably different in topography, Mexico proper and the peninsula of Yucatan. The latter is an immense plain, hardly anywhere more than 300 feet above sea level. In Mexico proper

the 1,600-foot line closely skirts the seashore, generally not more than 20 miles distant. The meaning of this fact may be realized by considering that almost the entire Mississippi Valley lies below that line. In other words, Mexico is almost wholly a land of lofty mountains and high plateaus.

Mexico proper again is subdivided topographically by the Rio Lerma into two parts—a larger northern and a smaller southern.

The dominant feature, the backbone as it were, of the northern part, is the mountain range known as the Sierra Madre, generally over 6,000 feet high, which, beginning a little south of the United States boundary near the Arizona-New Mexico line, runs southeastward parallel to the Gulf of California and about 180 miles from it, as far as the valley of the Rio Mezquital, beyond which, under various names, it takes on a more easterly course, terminating in the Sierra de Querétaro in the State of that name, in the eastern third of the peninsula. Northeastward from this rim extends the vast plain known as the Mexican plateau, most of it over 1,000 meters (3,280 feet) high. The eastern edge of it dropping down abruptly to the lowlands, presents from below the aspect of mountains and is accordingly called Sierra Madre Oriental.

In the southern topographic division, the trend of the mountain ranges is almost exactly east and west. The valley of the Rio de las Balsas separates these ranges into two systems—a northern, comprising the series of volcanoes from the Volcan de Colima to the Pico de Orizaba, and a southern, called Sierra Madre del Sur. In the northern range are found the highest peaks in the country: Pico de Orizaba, 18,696 feet; Popocatepetl, 17,883 feet; Ixtaccihuatl, 17,338 feet; Malinche, 14,632 feet; Nevado de Toluca, 15,163 feet; Cofre de Perote, 14,042 feet; Ajusco, 13,075 feet; Volcan de Colima, 12,989 feet. They form the southern rim of what is called the plateau of Anahuac, which has been the home of the densest population and the center of power from Aztec days down to the present.

Drainage.—On the high plateau of the north all the rivers end in drainless lakes or salt pans with the exception of the Rio Conchos, which empties into the Rio Grande. In the southern half the drainage, with the exception of a few patches, is to the ocean. The most notable exception, the valley of Mexico, has recently been made tributary to the Rio Panuco and the Gulf of Mexico through the canal and tunnel finished on March 17, 1900.

As might be expected from the configuration and from the distribution of rainfall, Mexico contains no large rivers. The two largest on the Pacific side, the Rio Lerma and the Rio de las Balsas, have already been mentioned. On the Gulf side the Rio Panuco, discharging at Tampico, is navigable for

a short distance. A veritable tangle of water courses intersects the rain-drenched lowlands of Tabasco, east of the Isthmus of Tehuantepec. The peninsula of Yucatan presents the remarkable spectacle of a rather humid country with almost no rivers, the drainage being underground, through innumerable channels in the limestone. In the arid region, as in the western United States, the rivers are mostly dry, except after rains.

Having to pass within a short distance from an altitude of 3,000 feet or more down to sea level, most of the Mexican rivers are torrential, presenting a succession of cascades and rapids, supplying an almost unlimited water power, which suggests vast possibilities of industrial development.

Soil and Minerals.—Soil.—Throughout tropical Mexico, ages of exuberant vegetation and abundant moisture, combined with high temperature, have led to profound rock decay and an accumulation of organic matter, so that the land has become enveloped in a deep mantle of the richest soil. To this are added, in many regions, the products of volcanic eruptions, proverbial fertilizers. Where irrigation can be used in the arid region, as along the Rio Nazas in Durango and Coahuila, in the alluvium washed down from the mountains for ages, and largely unleached by rain, the soil proves to be of astonishing fertility.

Minerals.—A map will show to what extent the crust of the earth through the greater part of the Mexican peninsula has been rent by volcanic action. As a result, the rocks have been impregnated with ore to a degree hardly equaled anywhere on the globe. For centuries Mexico has been known mainly as a land of untold mineral wealth. The wide distribution of volcanic phenomena suggests the presence of valuable minerals almost anywhere.

Population.—In northwestern Europe an area equal to that of Mexico contains 180 million inhabitants. To attain that figure, Mexico would have to multiply her 15 millions twelvefold. So far as resources are concerned, it seems not impossible that she might eventually support such a population, for in minerals, water power, and soil she may, on the whole, be regarded as equal to any European country. However, development depends not merely on the gifts of nature, but also on the quality of the population.

That the aborigines were possessed of considerable natural endowments is attested by the comparatively high degree of civilization which some of them had attained, by their own unaided efforts, so far as can be judged. The skill shown in their architecture and sculpture, as evidenced in the vast ruins of their cities, the astronomic and mathematical knowledge recorded in the Aztec calendar stone, the highly developed systems of writing of the

Aztecs and Mayas, their military and civil organization, were no doubt the patrimony of a comparatively small class, segregated from the bulk of the population by long selection; but this is true of all civilizations, and the very fact that the development of such a class was possible proves that its elements pre-existed in the race at large. However, the present civilization of Mexico is essentially of European origin and is maintained by people who are entirely or mainly of European blood.

The last census of Mexico was taken on October 28, 1900, and special efforts were put forth to make it as accurate as possible. The bishops issued pastoral letters exhorting the faithful to facilitate the task, explaining that it was not intended to levy new taxes but would be a benefit to the nation. The result gave a population of 13,611,694 inhabitants, an increase of about 1,000,000 since 1895, or 7.45 per cent in five years. The census does not recognize race distinctions, but the Statesman's Yearbook states that the whites form 19 per cent., the mixed race 43 per cent., and the Indians 38 per cent. of the total. Such figures can only be approximate, as the three elements shade off one into the other imperceptibly. While some authorities give the percentage of whites as high as 22 per cent., in Bulletin 38 of the United States Department of Labor the conjecture is expressed that perhaps less than 5 per cent. of the population are quite free from Indian admixture.

The table on this page shows that the population is mainly concentrated on the plateau Anahuac, comprising the Federal District, and the States of Tlaxcala, Mexico, Guanajuato, Puebla, Hidalgo, Querétaro, and Morelos.

MEXICAN STATES AND TERRITORIES IN THE ORDER OF DENSITY OF POPULATION PER SQUARE KILOMETER.

STATES AND TERRITORIES	Number.	STATES AND TERRITORIES	Number.
Federal District.....	451.26	Guerrero.....	7.40
Tlaxcala.....	41.7	Zacatecas.....	7.20
Mexico.....	39.0	Tabasco.....	6.12
Guanajuato.....	36.04	Nuevo Leon.....	5.25
Puebla.....	32.29	Tepic.....	5.14
Hidalgo.....	26.19	Chiapas.....	5.11
Querétaro.....	25.32	Durango.....	3.76
Morelos.....	22.28	Yucatan.....	3.44
Michoacan.....	15.79	Sinaloa.....	3.40
Jalisco.....	13.98	Tamaulipas.....	2.59
Aguascalientes.....	13.39	Campeche.....	1.85
Veracruz.....	12.96	Coahuila.....	1.80
Colima.....	11.06	Chihuahua.....	1.44
Oaxaca.....	10.34	Sonora.....	1.11
San Luis Potosi.....	8.77	Lower California.....	.31

Persons acquainted with Mexican conditions affirm that the official figure of the last census falls considerably short of the reality, the Indians, in particular, being disinclined to submit to enumeration through fear of additional burdens. It is said that the true figure probably approaches 15 millions.

Spanish is the official language of the Republic, and is spoken and understood almost everywhere, but there are about two million individuals whose mother tongue is some Indian language. These languages belong to at least 13 families, which are mutually unintelligible. In certain remote districts Spanish seems even now to be almost unknown. This is especially true of Yucatan, where 83.7 per cent. claimed Maya as their native language. With the exception of the last named, however, the Indian languages possess no influence over the destinies of the nation. The entire social, educational, and political life of the Republic is carried on in Spanish.

A general characterization of so heterogeneous a population is, of course, impossible. The distinctively Spanish traits are well known—great physical endurance, natural politeness, bravery, and love of adventure. The stubborn resistance offered to the Spanish invaders, especially at the siege of the capital, proved that the natives, too, were of sturdy stock. One characteristic which impressed the early Spaniards, and which still impresses foreigners, is the native's fleetness of foot. The Spanish chroniclers mention that Montezuma was accustomed to dine on fish caught twenty-four hours earlier in the Gulf of Mexico, 260 miles away, and which, in the absence of other means, had to be conveyed to the capital by human carriers.

Señor Romero, late Mexican minister at Washington, says of the Mexican Indians: "In the state of Oaxaca, where I spent the early years of my life, I have seen Indians from the mountain districts who, when they had to go to the capital, especially to carry money, form parties of eight or ten to make a ten days' round trip, carrying with them their food, which consisted of roasted ground corn, which they took three times a day, stopping at a brook to mix it with water, and sleeping on the bare ground, preferring always the open air; getting up before daylight and starting on their journey at daybreak immediately after their early meal, speaking no Spanish, and traveling about 40 miles a day. When they reached the city of Oaxaca they would remain there one or two days, and go back to their homes without taking part in any dissipation."

However, in capacity for work, Señor Romero acknowledges the inferiority of the Mexican laborer to the American, and tries to trace the cause. He says: "The day's work of a Mexican laborer, very likely, represents in many cases only one-fourth of what is accomplished during the same

time by a laborer in the United States. A Mexican laborer working from ten to eleven hours a day, for instance, accomplishes less work, or produces less, than a European or an American laborer in seven or nine hours, and in some instances the disproportion is as great as one to five. I have been assured that a Mexican bricklayer in eleven hours' work does not lay more than 500 bricks, while a bricklayer in the United States lays 2,500 in nine hours. Mr. Enrique Creel, of Chihuahua, a prominent Mexican gentleman, of American parentage, stated, in an interview published by the DENVER NEWS of October 25, 1904, that a St. Louis contractor, who was executing a large contract for the Mexican Government, told him that a Mexican bricklayer could lay, on an average, 500 bricks daily, while an American bricklayer is able to lay 3,000 daily. Under such conditions the high wages of \$3 a day in the United States are no higher than the wages of 50 cents paid in Mexico, so far as the product of labor is concerned. The principal causes for this difference in working capacity are, in my opinion, the following: (1) The Mexican laborer is not so well fed as his fellow-laborer in this country; (2) he generally works until he is exhausted, and his work is not, therefore, so productive; (3) he is not, on the whole so well educated as the average laborer in the United States; (4) he has fewer wants to satisfy, and therefore less inducement to work. Perhaps there is, in addition to these causes, at least in some localities, another—a climatic influence, the enervating character of the tropical climate and the high altitude above the level of the sea, and the consequent lower atmospheric pressure at which a large portion of the population of Mexico is located. I am inclined to believe that this is a factor in the case, as a similar difference is noticed among animals. A plow drawn by one horse in this country would, in Mexico, require two or three horses to accomplish the same work in similar soil; and this shows that the difference in working strength may be due, at least in part and in some places, to natural causes or climatic influences."

Immigration.—In 1900 there were in Mexico 57,507 foreigners, classified as follows:

NATIONALITY	Number.	NATIONALITY	Number.
Americans	15,265	Germans.....	2,565
Arabs	278	Greeks.....	99
Argentinians	61	Guatemalans	5,804
Australians	72	Hondurans	34
Austro-Hungarians	234	Italians	2,564
Belgians	130	Japanese	41
Brazilians	27	Nicaraguans.....	24
Canadians	140	Peruvians	76
Colombians	68	Portuguese	59
Costa Ricans	25	Russians	61
Cubans	2,721	Salvadorans	25
Chileans	75	Spaniards.....	16,258
Chinese.....	2,834	Swedes	208
Danes	88	Swiss	208
Dutch	69	Turks	391
Ecuadorans	31	Uruguayans	11
English.....	2,845	Venezuelans	35
French.....	3,976	All others	43

The Spanish element is thus the largest, constituting about 28 per cent. of the immigrants. It is a remarkable fact that whereas the Spaniard as a rule does not seem able to make much of the opportunities of his home land, no sooner does he touch Mexican soil than he develops a remarkable energy.

"In Mexico," says Señor Romero, "the energy of the Spaniard is remarkable. He is forceful of word and phrase, energetic in his movements, immensely vital, tremendously persistent, and wonderfully enduring. After thirty years behind a counter, selling groceries, he retires, a man of fortune; not always large, but sufficient, and is still a man of force and ready for undertakings demanding good brain power and courage. They come over mere lads, from 10 to 15, toil and moil, feed frugally, and sleep hardly, and they become millionaires, bank directors, great mill owners, farmers on a large scale, hot-country planters and monopolists, for the Spaniard is born with the 'trust' idea, while his sons are too often dudes and spend-thrifts."

The Americans, who are second in the list of population of foreign birth, nearly monopolize the railway business and a large share of the mining industry; the English, French, and German colonies dominate largely in banking and in the wholesale business. A noteworthy accession to the population are the Mormon colonies in Sonora and Chihuahua, some of them dating back to 1886. They received 50,000 hectares (123,550 acres) of free land from the Government, and many other facilities. Eight colonies are now in existence and others are forming.

Two causes have hitherto checked European immigration into Mexico—

lack of communication and low wages. The former has been, in the main, removed, few parts of the Republic being now very remote from railway communication. In recent years there has also been some improvement in wages. At present wage-earners have no motive for going to Mexico when they can earn five or six times as much in the United States. On the contrary, for the farmer, who expects his remuneration from the products he elicits from the soil, the astonishing fertility of some portions of Mexico, together with the genial climate, requiring little expenditure for shelter and clothing, ought to offer exceptional opportunities. Now that the railways have opened the markets of the world to Mexican products, and science has taught man how to conquer malarial and yellow fever, it can hardly be doubted that systematic white colonization will in the end prove eminently successful, though many early experiments may be doomed to failure. At present, however, the advice given by American consuls and by others acquainted with Mexican conditions is, that a man with small means runs a serious risk in investing them in Mexican land.

What the Mexicans themselves think of white colonization may be gathered from an article in the *ECONOMISTA MEXICANO*, a periodical of unexcelled standing in that country which says: "If with only 57,507 foreigners, hardly one-sixth of whom were able to bring capital to the country, Mexico was able to obtain the development of its commerce, manufacturing, mining, agriculture, in a word, of whatever now constitutes its well-being, it may be calculated to what degree of prosperity this nation may arrive when it numbers at least two millions of foreign-born members among its population. It is beyond discussion that to the foreigners we owe the peace which we enjoy, if we admit the indisputable truth that peace is the result of labor. Mexico, beginning with the epoch of the Conquest, existed for over three centuries and a half—three centuries of Spanish domination and more than half a century of autonomous life—possessing the same elements of mineral, agricultural, and industrial wealth that it now possesses, but without taking advantage of them, through lack of initiative and of labor, and through lack of the cosmopolitan foreign elements, which during the last third of the nineteenth century brought us initiative and labor, with the corresponding investment of capital. The capital existed, but in embryonal form, in our great natural wealth to be exploited, but it was not exploited; as the immense quantities of capital in gold and silver which remain hidden in the bowels of our land required the arm of the miner to bring them to light and put them in circulation. The foreign capital applied to our natural wealth effected a rapid result, served to attract and circulate the Mexican capital locked up in the unexploited products of the

land. Before the arrival of these strangers, Mexico lived at war with herself, owing to lack of labor; with their arrival public tranquility descended on the land. The advent of labor meant the cessation of famine, and the cessation of famine meant the end of revolution."—*Monthly Summary of Commerce and Finance*.

TRADE BETWEEN THE UNITED STATES AND THE UNITED KINGDOM.—Trade of the United States with the United Kingdom in the fiscal year 1905 aggregated practically 700 million dollars and formed more than one-fourth of our total foreign commerce. Figures just presented by the Department of Commerce and Labor through its Bureau of Statistics show that the exports from the United States to the United Kingdom in 1905 aggregated 523 million dollars out of a total of 1,518 millions, and thus formed 34 per cent., or practically one-third of our total exports; imports from the United Kingdom aggregated 176 millions out of a total importation of 1,117 millions, and thus formed about 16 per cent. or practically one-sixth of our total imports.

On both the import and export sides of the account our trade with the United Kingdom is larger than with any other country. The imports from that country, as already indicated, were 176 millions, against 118 millions from Germany, 100 millions from Brazil, 90 millions from France, 86 millions from Cuba, 62 millions from Canada, 52 millions from Japan, and 46 millions from Mexico. The exports to the United Kingdom were 523 millions, against 194 millions to Germany, 141 millions to Canada, 76 millions to France, 73 millions to Netherlands, 53 millions to China, 52 millions to Japan, and 46 millions to Mexico.

Comparing conditions of our trade with the United Kingdom in 1905 with those of 1895, the imports from that country have grown from 159 million dollars in 1895 to 176 millions in 1904, an increase of 17 millions, or a little over 10 per cent., while exports to that country have grown from 387 millions in 1895 to 523 millions in 1905, an increase of 136 millions, or about 35 per cent.

The principal articles which form our enormous trade with the United Kingdom are chiefly manufacturers' materials and manufactures on the import side, and foodstuffs, manufacturers' materials, and manufactures on the export side. While the United Kingdom is not a large producer of raw material for use in manufacturing, at least in excess of her own requirements, she exports considerable quantities of material of this character drawn from other parts of the world, especially from her colonies. Of our imports of raw wool, which in 1905 amounted to 46 million dollars, about 17 millions was drawn from the United Kingdom; of our imports of pig

tin, which in 1905 amounted to 23 million dollars, about 12 millions was drawn from the United Kingdom; of hides and skins our imports from the United Kingdom in 1905 were nearly 7 million dollars in value; of india rubber a little more than 7 millions; of jute, flax, and hemp nearly 2 million dollars; of raw cotton, chiefly Egyptian, nearly a million dollars; of cabinet woods practically a million dollars, while diamonds and other precious stones imported from that country amounted to 9 million dollars.

Among the importations of foodstuffs about $1\frac{1}{2}$ million dollars' worth of tea was from the United Kingdom, about a half million dollars' worth of coffee, and one-third of a million dollars' worth of cocoa. Of finished manufactures, which form a larger share of the imports from Great Britain than do any other class, the most important are manufactures of cotton, manufactures of fibers, manufactures of iron and steel, and manufactures of wool. Even of cotton cloths, this cotton producing and manufacturing country imported in the fiscal year 1905 more than 6 million dollars' worth from the United Kingdom, which presumably bought from the United States practically all of the cotton contained therein, and after transforming it into manufactures sent the finished product back to us, while of other classes of cotton manufactures, such as laces, edgings, embroideries, threads, etc., the total imports from the United Kingdom are even greater than those of cotton cloth alone, being 8 million dollars in value. Of fiber manufactures, of which our imports last year amounted to 40 million dollars, fully one-half was drawn from the United Kingdom, including 11 million dollars of linen cloths, 4 million dollars' worth of burlaps woven from jute yarn produced in India, and 2 million dollars' worth of linen handkerchiefs.

The next largest group of manufactured articles drawn from the United Kingdom is composed of various products of iron and steel, a large proportion being in a partially manufactured form for further use in manufacturing, especially pig-iron, $2\frac{1}{2}$ million dollars; ingots, blooms, and bars, $1\frac{1}{4}$ millions; wire and wire rods, over a half million dollars, and sheet iron or steel, while tin plates amounted to $4\frac{1}{4}$ million dollars in 1905 against 12 million dollars in 1895. Woolen goods are next in importance in the list of manufactures imported from the United Kingdom, and included in 1905 over $2\frac{1}{4}$ million dollars' worth of cloths, and $5\frac{1}{3}$ million dollars' worth of materials designated as "women's and children's dress goods," while other miscellaneous manufactures of wool brought the amount from the United Kingdom up to fully one-half of our total imports of woolen goods, which last year aggregated about 18 million dollars.

Foodstuffs, manufacturers' materials, and manufactures form the principal items in the grand total of 523 million dollars' worth of merchandise

exported from the United States to the United Kingdom in 1905. Under the head of foodstuffs are included wheat, flour, corn, oats, meats, butter, cheese, cattle, sheep, canned salmon, and fruits. Under the head of manufacturers' materials, by far the most important item is cotton, and to this should be added leaf tobacco, lumber and timber. Under the classification manufactures, the most important items of export to the United Kingdom are copper, 14 million dollars' worth; mineral oil, 15 millions; leather and manufactures, the most important items of export to the United Kingdom; steel amounting to over 21 million dollars. The principal foodstuffs sent to the United Kingdom during the year were cattle, valued at nearly 37 million dollars; flour, 11½ millions; wheat, 3½ millions; corn, nearly 18 millions; fruits, 6½ millions; fresh beef, 22 millions; canned beef, 4 millions; bacon, 21 millions; hams, 19½ millions; pork, 7 millions; lard, 17½ millions; and butter and cheese, a little less than 1 million dollars each. Of manufacturers' materials sent to that country during the year, cotton is, as already indicated, by far the largest item, amounting to 176 million dollars in value, while leaf tobacco amounted to 9½ million dollars, lumber 5½ millions, and timber nearly 4 millions.

Of manufactures sent to the United Kingdom during the year, copper amounted to over 14 million dollars; upper leather for use in manufacturing boots and shoes, 11 millions; sole leather, 4½ millions; boots and shoes, about 2 millions; mineral oil, 14 millions; instruments and apparatus for scientific purposes, including electrical appliances, 2 ⅔ millions; builders' hardware, including locks, hinges, tools, and saws, over 2 millions; electrical machinery, over 1 million dollars; sewing machines, 1¼ million dollars; typewriters, 1½ million dollars; cars, carriages, and other vehicles, about 2 million dollars; agricultural implements, over 1 million dollars; paper, 2¼ million dollars, and paraffin, 4½ million dollars; while of articles not classified by the Bureau of Statistics as foodstuffs, manufacturers' materials, or manufactures, there were sent to the United Kingdom 3½ million dollars' worth of oil cake, nearly 4 millions of turpentine, nearly 2 millions of rosin, and about 1 million dollars' worth of cotton-seed oil.

The above figures relate solely to the trade of the United States with the United Kingdom, which term includes England, Scotland, and Ireland. The exports of the United States to all British territory in 1905 amounted to 740 million dollars, and formed 48.7 per cent. of our total exports, and the imports from all British territory amounted to 321 million dollars and formed 28.7 per cent. of our total imports. The figures of the United Kingdom show that imports from the United States in 1904 formed 21.6 per cent. of her total imports and that exports to the United States formed

10.6 per cent. of her total exports. The United Kingdom imports twice as much merchandise from the United States as from any other country of the world and as much as from all her colonies combined, but her exports to India, and in some years to Germany, are larger than those to the United States. Of the total imports of the United Kingdom from all parts of the world, 42 per cent. is foodstuffs, 33 per cent. raw materials for use in manufacturing, and 25 per cent. manufactures. Of her total exports of domestic products to all parts of the world 82 per cent. is manufactures.

TWO FIELD TRIPS.—Some of the classes of the Richmond, Va., schools have found these field trips very enjoyable as well as profitable. By actual sight and contact these lessons were impressed on the minds of the pupils in a way which would have been almost impossible even with maps, pictures, and word painting. The teachers had taken these trips first so as to familiarize themselves with the location and the mechanical side of the journey.

The seventh year pupils were taken on the electric cars to Drewry's Bluff, which is a distance of about eight miles. This was selected because it embraced so much of historical, geographical and nature study value.

Arriving at the station we took a walk of less than a mile through the beautiful woods which were now dressed in their gayest colors. This brought us to the great bluff overlooking the river where we enjoyed the lunch brought in boxes by the pupils.

Now we were ready to study the forms of land and water, and then to the scene of the conflict.

The troughs showing where the mouths of the cannon protruded and could cover the boats coming up the river.

The pits in which were built the platforms on which the cannon were placed.

The pupils thoroughly interested were asked to tell of the battle and the names of the boats which took part.

As we walked back to the car the trees, both by bark and leaves, were studied. The leaves were gathered for study the next day and also to form a border around the wall of the room.

Another trip was taken by the 7 A class to a park of great *natural* beauty. This trip cost the pupils ten cents each, while the other had cost twenty cents each. Here they were conducted to the mineral springs under the side of the hill. The pupils were asked *why* were these so.

The clearness of the water noticed was compared with the muddy water of the river which we would see presently. Which had you rather drink? Then a walk through a *valley* brought us to a beautiful lake surrounded

by hills and fed by the creek and springs which we had noticed. The outlet of the lake tumbling over the rocks forming miniature cataracts. Some of the hills almost bare, with little soil, and, therefore, the kind of vegetation expected. Others more soil. How formed and more vegetation.

Another walk brought us to the river where we rested.

Our lunch was eaten in sight of the quarry from which so much of our granite comes.

Our nature study was conducted in the same way as on the other trip, the children furnishing the greater part of the information.

The teacher took part in the games in which the children indulged after the walks were ended and although no strict discipline was enforced the children were as respectful and obedient as when in the school room.

LOULIE C. KELLEY.

RECENT DECISIONS OF THE U. S. BOARD ON GEOGRAPHIC NAMES.

Alatna: River, northern Alaska; large branch of Koyukuk river from the northwest. (Not Ah-lash-ok, Alashuk, Al-lash-ook, Allatna, Allen, Allenkakat, nor Oklashok.)

John: River, northern Alaska; tributary to Koyukuk river from the north near longitude 152°. (Not Alchickna, Ascheeshna, Fickett, nor Totsenbetna.)

Kittatinny: Mountains, New Jersey and Pennsylvania. (Not Blue nor Kitatinny.)

Link: River connecting Upper and Lower Klamath lakes, Oregon. (Not Klamath.)

Shoshone: Indian Reservation, Fremont county, Wyoming. (Not Wind River.)

Spottsylvania: County and courthouse, Virginia. (Not Spotsylvania.)

Storey: Island, Prince William sound, Alaska; just north of Naked Island. (Not Little Naked nor Story.)

Storey: Slough; one of the outlets of the Copper river, Copper river delta, Alaska. (Not Story.)

Wild: River, northern Alaska; a large affluent on the north side of Koyukuk river, near longitude 151° 30'. (Not Hokotena, Totsenbet, Totsenbetna, Totzunbetna, nor Totzunbitna.)

CURRENT ARTICLES ON COMMERCE AND INDUSTRY.—

December:

Canada, The Dominion of, *Consular Report*, Nov.

Child Labor: Turning Children into Dollars, *Success*.

China and the United States, *Nat'l Geog. Mag.*

- Commercial Geography in Secondary Schools, *Journ. of Geog.*
Entomology; Fighting Bugs with Bugs, *Sat. Evening Post*, Dec. 16.
Flax Industry of To-Day, *Sci. Am.*, Dec. 9.
Flaxseed and Its Products in the United Kingdom, *Crop Reporter*.
Germany: How the Germans Revised their Tariff, *Rev. of Revs.*
German Empire Trade with the United States, *Cousular Report*, Nov.
Glass: How Window Glass is Made, *Paint, Oil and Drug Rev.*, Nov.
22, 29, Dec. 6, 13, 20.
Japan: Importance of the Banto, *Consular Report*, Nov.
Lumbering: The Wasteful West. *Sat. Evening Post*, Dec. 23.
Materials of Commerce: Explanatory Notes on the Mexican Tariff,
Bull. of Intern. Bureau of Am. Republics.
Mountain Peoples in Relation to their Soil, *Journ. of Geog.*
Newsgathering, The Romance of, (Ill.), *Success*.
Newspaper: The Making of a Modern Newspaper, *World To-Day*.
Oil Industry, The Magnitude of (with pictorial charts) *Sci. Am.*,
Dec. 30.
Oriental Rugs (Ill.) *House Beautiful*.
Russia in Recent Literature, *Nat'l Geog. Mag.*
Salmon, The American Industry (Ill.), *Business Man's Mag.*
Transportation Routes and Systems of the World (with map) *Mo.*
Summary of Comm. and Fin., Nov.
Venezuela and the Problems It Presents (Ill.), *World's Work*.

NEWS ITEMS

The second annual meeting of the Association of American Geographers was in every way most successful in spite of the unfortunate absence of several authors who had announced papers. The program of papers included twenty-three papers actually given and thirteen papers read by title. Six papers were given in educational geography, several of which will be printed in this JOURNAL.

The Presidential Address by Professor W. M. Davis was a most thoughtful and suggestive paper entitled AN INDUCTIVE STUDY OF THE CONTENT OF GEOGRAPHY. The papers in full or in abstract will be printed in the *Bulletin of the American Geographical Society* probably in February.

Mr. Cyrus C. Adams, of the American Geographical Society was elected president for the year 1906, and Professor Albert P. Brigham of Colgate University was continued as secretary-treasurer.

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No. 3

LABORATORY WORK WITH THE SUN

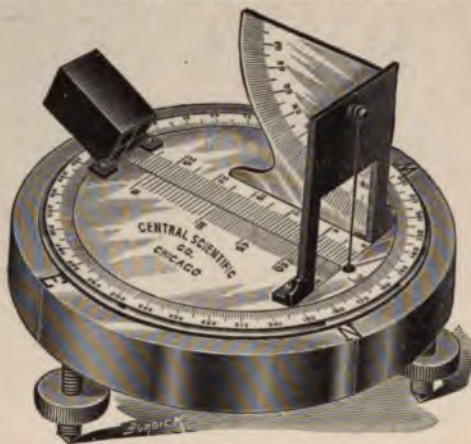
By J. PAUL GOODE

Assistant Professor of Geography, University of Chicago

THE attitude of the sun to the earth is most vital. With the sun high in the sky day after day a warm climate results. With an increase in the length of day, that is, with an increase in the number of hours of sunlight, summer returns to the higher latitude. On a summer day the temperature of the air rises rapidly with the rising sun, and culminates some time after the culmination of the sun; and the coolness of evening becomes very apparent before the sun has set. These things are noticed in a general way in the study of geography and physiography, but it is not often that any attempt is made to make observations quantitative. Crude and simple devices are sometimes provided by ingenious teachers, and very satisfactory results are gained, and a very earnest interest aroused. Sometimes very accurate results are gained by such devices. But more often the limitations of the apparatus offer a real obstacle to any quantitative work, making observations valuable merely in a qualitative way.

The principles involved in taking quantitative observations on the sun are simple. They are not too difficult for the intermediate grades. The circle and its elements; even the sines, tangents and co-tangents, as geometrical relations, if observed, and dealt with graphically, are fascinating to a fifth grade boy. Give him the compasses, the protractor and scale, and put the angles before him to be read, and he will take pleasure in solving many problems. The actual instrumental work fixes the principles in the memory of the observer as no amount of drill on the mere formulas ever can do. To make it possible at a minimum expense, for teacher and student to do the instrumental work, the author has devised a little instrument with the homely name of Sun Board. It is only five inches across, carrying within

its outer rim a movable horizon about three inches in diameter. Upon this



horizon is a doorway an inch high thru which the sun may shine. Behind the doorway is a quadrant upon which the sun may cast the shadow of the top of the front board, so making it possible to read the sun's altitude direct. Thru the horizon a diameter with a scale alongside is etched from the middle of the doorway so that shadow lengths may be read upon the horizon. Three leveling

screws beneath the frame of the instrument, and a plumb line hanging in front of the doorway, make it possible to establish the horizon. Opposite the doorway a hinged beam box makes it possible to read from a scale the power of a sunbeam in heating the surface upon which it falls.

Several other relations may be demonstrated with the instrument, and it may be worth while to make a list of its uses, and to suggest a number of problems which may be solved by its use.

1. *To Establish the Horizon.* Put the Sun Board upon the window sill, or floor, or some firm, approximately level surface, and adjust the level by the three leveling screws. The level will be established when the plumb line rests in the middle of the hole in front of the doorway. This hole is only about two millimeters in diameter, so the adjustment is close. The principle involved here is that a level surface is at right angles to the "line of direction," and the line of direction is the path taken by a falling body, or by a string hanging freely and supporting a weight *e. g.*, the plumb line. The plumb line is then a line vertical to the established horizon.

2. *To Read the Sun's Azimuth,* (or angular distance from the south point). In meteorology all positions in the horizon are read in degrees from the south point around by way of the west. West is thus 90° , north 180° , east 270° , and so on.

Place the Sun Board with its south and north points in the meridian, which, for the present exercise, may be determined by means of a compass. Turn the movable horizon until the doorway faces the sun, and watch the shadow of the plumb line as it falls under the doorway. When this

Shadow coincides with the scaled diameter crossing the horizon of the instrument, the doorway end of this diameter gives the reading of the sun's azimuth, on the graduated circle on the stationary frame of the instrument. The plumb line being vertical, may be considered as an element in a vertical circle, and when its shadow coincides with a diameter of the movable horizon, we have located the vertical circle passing thru the sun and the zenith. The angle in the horizon between the south point and this vertical circle, is the azimuth. A vernier limb is engraved upon the movable horizon making it possible to read the azimuth to 15 minutes of arc. Any time in the day, then, from sunrise to sunset, azimuth may be read with great ease. But a meridian established by a compass is not reliable. One cannot be sure that it is true.

3. *To Establish the True Meridian.* Where is the south point? This seems an easy question, until we look it squarely in the face. We may fix the meridian with more or less accuracy in several ways:—

(a.) We may locate it with a compass, if the compass is accurately made, and if it is not influenced locally by iron or steel objects. But the compass needle does not point to the true north except along the line of no variation, which in this country runs near Detroit, and Charleston, S. C. The observer needs to know then the exact amount the needle varies from the true north in his locality. This is very hard to find, for when an approximate value is taken from the chart of magnetic variation, there are in many places rather large local variations, a fact which puts our compass readings in some doubt. Then too, the variation for our locality as found, must be dated because a slow change in the value of the magnetic variation is in progress, adding another uncertainty to the list. So the compass is far from being a satisfactory means of establishing the true meridian.

(b.) Given an accurate clock or watch, we may set it at the time of sunrise or sunset, as given in the almanac, and so establish our meridian by the shadow of a vertical stick at the instant of noon by the clock. But a number of errors may enter here. For example, the sun's disc covers an arc of about half a degree and the true instant of sunrise is when the center of this disc crosses the horizon. An ordinary observer must guess at this instant, or he may take the instant the disc first appears, and make a correction for the semi-diameter of the disc. This is not a serious error. It would make a difference of less than a degree in the true reading of the meridian. Again the times of sunrise and sunset are given in the ordinary almanac for only two or three latitudes in our whole wide area. If the observer does not live in these particular latitudes, errors of judgment are

certain to enter, and the possibility of error increases with the increase in latitude. And again a much greater possibility of error confronts us, in that the sun crosses the meridian at the clock noon, it may be, only once in the year, and on only four days in the year will it come within six or seven seconds of it. On all other days the sun will be either faster or slower than the clock, the maximum error being over 16 minutes. So one must refer again to a table in the almanac to find the exact time at which the sun crosses the meridian on the day the observation is to be made.

(c.) With the Sun Board the problem is very simple. If we can install it where we may take azimuth readings at sunrise and sunset, we may divide the horizontal angle between these two readings, and have our true south point. For this first determination, the instrument may be put down in any random position, so far as concerns the point upon it marked "south," for all one needs to do is to get a reading for the horizontal angle between these two points. When the reading of the midpoint between sunrise and sunset has been found, still being careful not to move the instrument, rotate the horizon, to bring the zero of the vernier limb, to this reading. Now the plumb line, and the vertical wire in the beam box, (when the box is in the horizontal position), will serve as two sights, to control the erection of two pins or wires which may be driven into the floor or window sill, and between which a permanent line may be drawn, as the position of the meridian. This position will be true to within fifteen minutes of arc.

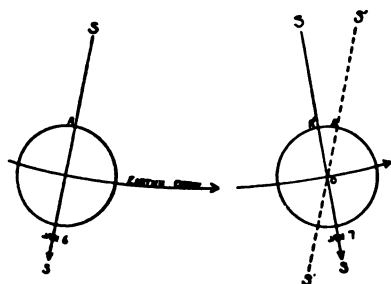
It is not absolutely essential to have the Sun Board in the sunlight at sunrise and sunset. It may be put in any south window and the meridian determined as follows: Take an azimuth reading in the forenoon, when the sun has a given altitude, say 45° (see problem 6, below), and then take the azimuth reading in the afternoon, when the sun has fallen again to an altitude of 45° . The midpoint between these two readings, is the south point, and the meridian may be established as above described.

It will be noticed that this is the *true meridian*. The sun will cast its shadow on this line, at noon by the clock on only four days in the year, even if the clock is keeping 'sun time,' because solar days are not of uniform length, as the clock days are, being longer at perihelion and shorter at aphelion. And this difference, very seldom thought of, perhaps even ignored in our teaching, may be illustrated and made plain by actual measurement with the Sun Board.

4. *To Make a Graphic Construction of the Time Equation: The Analemma.* The period of the earth's rotation is about the most perfect

unit of time measurement known. To measure the length of this period one must take a base of reference on some object outside of the earth. And here trouble begins, for a dual opportunity of reference presents itself; we may refer to a star, taking the period between two successive appearances of this star in our meridian, and we have what is called the "sidereal day," a period which is uniform, day after day thru the year. This is the real basis of our system of time. But the determination of this day is difficult to the ordinary observer, tho a relatively simple matter in the astronomical observatory. The other method of measuring the period of rotation is most obvious, but gives a variable result, and lays us liable to serious difficulties in the time measurement; this method takes the sun as the extra-terrestrial point to which the earth's rotation is to be referred. The period intervening between two successive crossings of our meridian by the sun, is the solar day, and its very obviousness has forced it upon us as the ordinary unit of time measurement. But the length of this period is quite variable thru the year, being longer in our winter and shorter in our summer. Now it is in the nature of our clocks to keep a uniform rate of time, and we should have to be setting our clock every day in the year, sometimes slower, sometimes faster, to keep it with the sun. This on the face of it would be intolerable, and the easiest solution of the difficulty is the adoption of an *average*, or *mean solar day*. This is the period which, subdivided, gives us the hour, minute and second. The year, and all other duration is measured in this unit or its derivatives.

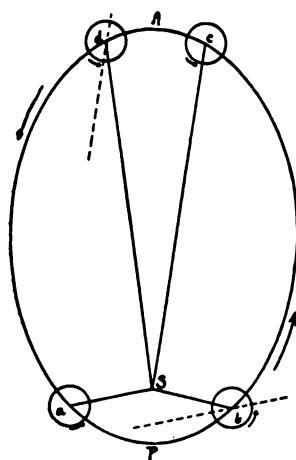
The graphic illustration of the difference between the sidereal day and the solar day, will make it easy to understand the difference between the solar day and the mean solar day. If an observer A, starts say Jan. 6, with



the instant the sun is in his meridian, s-s, to measure one earth's rotation, he will have passed thru 360° of arc, when he has arrived at position A in the plane S'-S' on Jan. 7. This is the measure of the sidereal day, the star being so far away that its rays are practically parallel at all parts of the earth's orbit. In the diagram this is shown, by making S'-S' of Jan. 7 parallel with S-S of Jan. 6. But the observer at A on Jan. 7 is not yet at noon, because in the one rotation the earth has traveled forward in its orbit about one degree, represented in the drawing by S'O'S, and the observer

parallel with S-S of Jan. 6. But the observer at A on Jan. 7 is not yet at noon, because in the one rotation the earth has traveled forward in its orbit about one degree, represented in the drawing by S'O'S, and the observer

must travel on over the arc $A A'$, before he has the sun again in his meridian. This longer arc, which as we see, is about 361° of rotation, is the solar day. Now if the earth's orbit were a circle, and its rate of travel in this orbit were uniform, this longer arc would be uniform, day by day, and would give us as uniform a period as the sidereal day. Under these conditions a clock running with a uniform rate might be set by the sun, and stay with it all the year. But the earth's orbit is an ellipse, and the earth, for six months, from aphelion (A) to perihelion (P), is a falling body, coming closer and closer to the sun, and increasing its linear velocity as a consequence. So that in a unit of time, it passes over a considerably longer arc and larger angle in the region of the perihelion, (*e. g.* aPb) than it does six months later, at aphelion, (cAd). Thus in a sidereal day at perihelion a longer



arc of orbit is passed over, and a larger increment of time must be added by the observer to bring him to his meridian, than is the case at the aphelion. Thus in the perihelion part of the year the clock noon arrives before the sun crosses the meridian, and the sun is said to be 'slow.' Again at aphelion the mean solar day is a little longer than the actual time between meridian transits of the sun, and the sun comes to his meridian before the noon of the clock, and the sun is said to be 'fast.' A little consideration will show that the mean solar day must be a trifle longer than the shortest solar days at aphelion, and somewhat shorter than the longest solar days at perihelion.

Thus there will be four times in the year at which the sun will coincide with the clock, being alternately faster and slower than the clock in the intervals. To establish this relationship we have the time equation. To observe it and chart it graphically is our present problem.

With the Sun Board in place, *i. e.* the scaled diameter accurately in the meridian, take the time at which the shadow of the plumb line lies in the meridian. Set down this reading as so many seconds or minutes before, or after the clock noon, as the case may be. Take as many readings as possible



thruout the year, and enter them in a graph, as follows: Draw a right

line AB which shall stand as the earth's orbit, making it $365\frac{1}{4}$ units long, for the days of the year. This line may be laid off on cross ruled paper, and the months with their days indicated. Then enter each observation at its proper day, as a line at right angles to this base line, with a value expressed in convenient units; for example giving the ordinate of sun's error a value equal to the space covered by five days on the year line. Let all 'sun fast' observations be "+" and entered above the line, and all 'sun slow' observations "-" and entered below the line. When the year's record is complete, connect the termini of all these sun's error lines with a smooth curve. The dates of the intersection of this curve with the line A-B, are the dates when the sun time and clock time coincide. These dates are about April 14, June 15, Sept. 1, and Dec. 25.

The observations for this study may be made any convenient day, and the sun's error entered for the record, tho one would wish to have more frequent observations at the time of the sun's maximum departure from the clock time.

The time equation is sometimes graphically shown in the form of a figure 8, called an analemma, which one may see and study, on a good globe.

So far in this problem we have assumed that the clock was keeping local time. But many people, perhaps most people in America do not now set their clocks by the sun. They keep standard time instead. Of course for all people living on a standard time meridian the above instructions apply, because standard time for them is their own local time. But if the observer live at one side of the standard time meridian, there is a correction for his longitude to be remembered and applied. This leads us to the next problem:—

5. *To measure the difference between local or sun time, and standard time.* Install the Sun Board in the true meridian. Rotate the movable horizon, bringing its scaled diameter into the meridian, with the plumb line at the south point. The sun now will cross the meridian when the shadow of the plumb line falls in this diameter. If, now, the clock or watch used has the correct standard time, the observer will note carefully the exact time the sun crosses the meridian. Let us suppose the observer to be at Green Bay, Wis., and that he makes the observation on Jan. 10. He finds that the shadow of the plumb line falls in the meridian at eleven o'clock 23 minutes and 32 seconds: that is, 36 minutes 28 seconds before the noon of standard time. Referring now to the time equation he finds the sun on Jan. 10, 14 minutes 28 seconds fast. Subtracting this 14 minutes 28 seconds from 36 minutes 28 seconds leaves us 12 minutes, a difference which standard time brings to the reading. Since this 12 minutes shows the clock

to be slow, the observer may know that he is east of the meridian from which his standard time is reckoned. And since one degree of longitude is equal to 4 minutes of time, dividing this time difference by 4 will give him his longitude difference; $12 \div 4$ equals 3° and 3° from 90° equals 87° west, the observer's longitude.

6 and 7. *To measure the sun's altitude.* Place the Sun Board in its meridian as before, and rotate the inner horizon, so as to face the doorway toward the sun bringing the shadow of the plumb line into the scaled diameter, so establishing the sun's azimuth. The sun will be shining directly into the doorway, and illuminating the scale of degrees making it possible to read the angle of the sun's elevation. This is a very convenient scale for altitudes between 20 and 60 degrees, but for angles higher than 60 the degree spaces are too small and in the nature of the case the angles below 20 cannot be read. An alternative and superior method of taking the sun's altitude is provided in the vertical quadrant behind the doorway. This reads all angles equally well from the horizon to the zenith. The rear edge of the top of the door frame runs thru the center of curvature of the quadrant and the sun shining across this line, casts the shadow of the doorway upon the quadrant. The angle left illuminated reads the sun's altitude. The small size of the instrument gives it a decided advantage in this reading, for the scale where read is only an inch and a half from the top of the door frame which casts the shadow. This reduces to a minimum the error due to diffraction, giving an opportunity to read to an estimated fraction of a degree.

Another way in which the sun's altitude may be studied, is found in the linear measurement of the shadow of a vertical post. The doorway serves the same purpose here, and a scale is provided in inches and twentieths reading from a zero point in the front surface of the doorway. So one may read this shadow length at noon, on random days thru the year, watching it grow very short when the sun is at a high altitude at noon in June, and then increasing in length day by day until its farthest reach on the winter solstice, Dec. 21st.

Another interesting study may be made, of the altitude of the sun, hour by hour through the day. The very rapid change in altitude in morning and evening, and the extremely slight change in altitude during the middle of the day, have a very close relationship to the daily range of temperature, which may be worked out graphically. For the heating power of the sun is a function of the sun's altitude. This special problem is taken up under Problem 9.

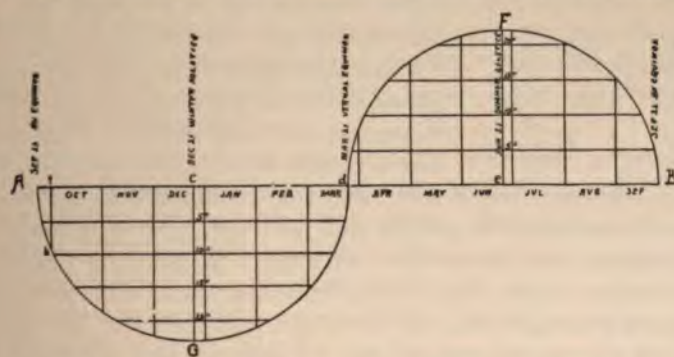
8. *To determine the latitude of the observer.* On the day of the

equinox the sun's vertical ray is on the equator, and the poles have tangent rays. At noon on this day the sun's altitude all over the earth, is the complement of the latitude of the observer. For example, at latitude 30° the sun will have an elevation of 60° at noon; and $90^\circ - 60^\circ$ equals 30° , the observer's latitude. On this day, then, any observer, reading the sun's altitude at noon, may subtract this reading from 90° and have his latitude.

At the other critical dates, the solstices, the problem is also easy. For at the summer solstice the sun's vertical ray is $23\frac{1}{2}^\circ$ farther north than at the equinox, so from the sun's altitude at noon, one subtracts $23\frac{1}{2}^\circ$, and then proceeds as before. For the winter solstice one adds the $23\frac{1}{2}^\circ$ to the noon elevation before subtracting from 90° .

It ought to be noted here that there are two solutions of the problem when the sun's elevation is $66\frac{1}{2}^\circ$ or over. For example if the sun's noon altitude is 80° , the solution given above is followed if the sun is on the equatorward side of the observer: $80^\circ - 23\frac{1}{2}^\circ$ equals $56\frac{1}{2}^\circ$; $90^\circ - 56\frac{1}{2}^\circ$ equals $33\frac{1}{2}^\circ$, the observer's latitude. But if the sun is on the poleward side of the observer, he must subtract the complement of the sun's noon altitude from $23\frac{1}{2}^\circ$ for his latitude. Thus: $90^\circ - 80^\circ$ equals 10° ; $23\frac{1}{2}^\circ - 10^\circ$ equals $13\frac{1}{2}^\circ$, the observer's latitude.

Of course for any intervening day, between equinox and solstice one may consult the ephemeris, or one of the larger almanacs, and find the altitude which corresponds with a given day. Or one might make his own table by constructing a projection of the path of the vertical ray, making it possible to read directly from this graph, the sun's declination for any day in the year. To construct this graph lay off on a right line a distance A-B which shall be 365 units long, for the days of the year. Di-

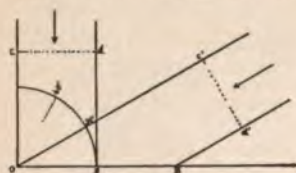


vide this line into quarters. With one quarter as a radius, and with a center at c, strike the semicircle AGd, and with e as a center the semicircle

dFB. This radius cG is then divided into $23\frac{1}{2}$ units beginning at c, and the same with eF beginning at e. These divisions are for the latitude degrees covered by the sun's vertical ray. Thru these degree points lines are now drawn parallel with AB to cut the circumference of the semicircles. Now consider point A the autumn equinox, c the winter solstice, d the spring equinox, e the summer solstice, and B the autumn equinox again, and lay off the calendar on the line AB, showing the days of the month at the day spaces, and drawing ordinates or vertical lines through the day points to cut the semicircumference below or above the line as the case may be. One now reads the sun's declination for a given day, as for example Oct. 1, by reading the degrees indicated on the day's ordinate gh. And in the Northern Hemisphere this reading would be added to the sun's altitude at noon on Oct. 1, before subtracting from 90 to find the observer's latitude.

The year having 365 and *one-fourth* days this construction will not give strictly accurate values, tho they will be quite close enough for purposes of laboratory exercise.

9. *To show the relation between the sun's altitude and its heating power.* Leaving the influence of the atmosphere out of account, the sun's power in the production of heat, varies inversely as the surface covered by a beam of given cross section. This area covered bears a simple relation to the angle of the incident beam. A vertical beam has the maximum efficiency, for here it is concentrated on the smallest possible surface. As the beam is inclined it covers a larger surface, so the unit area receives less energy. For instance, at an elevation of 30° the beam, covering twice the original area, (Fig. 6, OB equals 2OA) will give to the unit surface only one-half the energy which the vertical beam would give. This principle is



taken advantage of in the beam box of the Sun Board, and the scale provided with it. For this determination the Sun Board may be placed in the sun anywhere, without reference to the meridian, and leveled. Then the horizon is rotated to bring the beam box toward

the sun. The beam box is now rotated on its hinge until the two cross wires in the box, which are parallel with the hinge, bring their two shadows into coalescence upon the movable horizon. This assures the proper altitude of the box. Now rotate the horizon until the cross wire in the box which is at right angles with the box hinge, casts a shadow into the scaled diameter on the movable horizon, and the sun's azimuth is found. These two adjustments put the beam box into coincidence with the sun's beam.

The box has a cross section of a square half inch. Running along the en-

graved diameter, is a scale of half inch units, divided into tenths, and reading from a zero in the hinge line of the box. Thus when the box is vertical its inner surface encloses just a square half inch of the horizon. When it is inclined, the sun shining thru it illuminates the movable horizon, and the area covered by the beam can be measured exactly in units and tenths from the part of the scale illuminated.

The intensity of insolation is thus read arithmetically in terms of the efficiency of the vertical ray, as the reciprocal of the scale reading. Thus if the beam covers 2 scale units the intensity is $1/2$. If it covers three scale units, the intensity is $1/3$. If the reading is 1.3 the intensity is $1/1.3$ and so on.

An exercise may now be set to show the heating power of the sun for all the hours of a given day. The readings may be taken with the Sun Board on each even hour, the observations recorded in a table, and the table then converted into a graph as follows:—On the cross ruled paper lay off a line

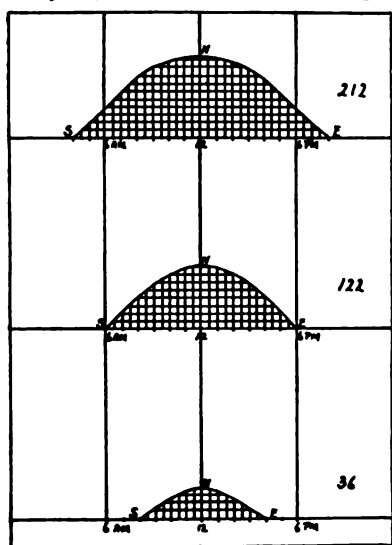


of convenient length, AB, which is divided into equal spaces for the hours of the day. Number the hours each way, from the mid-point, which is 12, noon. On the noon ordinate, (12-

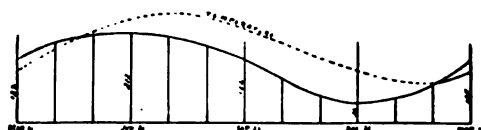
C) lay off a convenient unit (12D) for the heating efficiency of the vertical beam. In this unit the insolation of all inclined beams will be expressed as fractions. These fractions, the reciprocals of the scale readings converted into simple or decimal form are the natural sines of the sun's elevation, and are to be laid off each on its respective hour ordinate. Connect these points and the sunrise and sunset points, and we have the graphic record of the insolation for each hour of the day. The area of the figure AEBNA is the sum of the total day's heat receipt, which can be expressed in any convenient unit of area.

It will be an interesting and very valuable exercise, to make such figures for a series of days chosen at critical dates thru the year: For example at summer solstice, equinox, and winter solstice. Fig. 8 shows how three such graphs of heat receipt might look. The comparison between them will be easiest expressed in a common unit of area, say the square of the cross ruled paper, enclosed by the curve (SNE) limiting the reciprocals of the hourly readings. In this case these numbers are 212, 122 and 36. One cannot look at these three graphs without seeing why there is a warm season and a cold season.

Such "daily heat receipt" graphs may be made for various days thru the year, and the area of each expressed in a numeric. These numbers may



then be built into a graph which will show very accurately the accumulation of heat of our summer, and the waning heat receipt of winter. On the same paper with the record of heat receipt, we may enter day by day the temperature of the air. The average daily temperature is the best to use for this, tho a reading taken at eight or nine in the morning will serve admirably. This graph puts before our eyes the real proximate cause of the change of season, expressed quantitatively, and accompanied by an actual temperature record of the results of a variable heat receipt.



SOME RESULTS OF SUN OBSERVATION IN THE FOURTH SCHOOL YEAR

"From observation children should be able to conclude: 1. Warmest part of day when sun shines from most directly above by comparing with morning and evening temperature. 2. Warmest season of year when sun rises highest in heavens during daily track by comparing sun's shadow observations. 3. Warmest parts of earth would be where sun shone most directly upon the earth during the year."

THE GEOGRAPHY COURSE IN THE OSWEGO STATE NORMAL AND TRAINING SCHOOL

By AMOS W. FARNHAM
Oswego, N. Y.

PART II

GEOGRAPHY METHOD

THIS course is pursued two years after the course in subject matter, as outlined in this JOURNAL for February, 1906, has been taken.

The time devoted to this phase of the work is five forty-five-minute periods weekly for twelve weeks. The work is outlined in detail below:

- A. Analysis of subject matter, noting,—
 1. Causal relations.
 2. Processes of reasoning involved.
- B. Reorganization of subject matter with a view to teaching it, organization determined by,—
 1. Children's present development.
 2. Children's interests, habits of thinking, and necessities.
Note.—Logical and pedagogical arrangement of subject matter distinguished.
- C. A consideration of the use of the reference library, illustrative material, and apparatus: raw and manufactured products, models, pictures (lantern slides especially), text-books, globes, maps, etc., with practical illustrations.
- D. A discussion of the value of excursions to the fields, to shops, to local industries, etc., and how such excursions may be made with classes of children.
- E. A study of the relation of geography to other subjects of the course, noting that geography is a basis for correlation.
- F. Talks given by members of the class in practice, in which they outline their work so far as they have gone with it, stating difficulties met and how overcome; at the same time exhibiting material and apparatus used, and stating how used. These talks are found to be valuable not only to the method class, but to the members of the practice class as well.
- G. Making of lesson plans, stating for each particular lesson,—
 1. The aim.
 2. The preparation.
 3. The presentation.
 4. Minor and major summaries.

- H. Observation in the school of practice during the last week of method course. During "observation week" the members of the incoming class observe the children assigned to them, studying methods of teaching and discipline, also noting the order of receiving and excusing classes, the order of passing material, and other mechanical devices which save time and tend to promote good order.

PART III

PRACTICE TEACHING

This part of the geography course is taken during the term (twenty weeks) immediately following the method work. Outlines of all lessons are submitted to the supervisor of geography for correction, suggestion or approval. The supervisor visits each class one or more times each week and then expresses his judgment regarding the work, either orally or in writing, to the respective practice teachers. He holds a geography conference weekly, at which time questions of general interest to geography teachers are discussed.

The geography work in the school of practice begins with the fourth year above the kindergarten, and is usually finished the first half of the ninth year. It is quite fully outlined so that each teacher may know its scope; therefore may know what precedes and what follows the work of her grade and hence the relation of her part to the whole.

THE WORK OF THE GRADES

Fourth Grade: Home Geography and the World as a Whole.

Home Geography.

The very first step in a knowledge of geography is to know thoroughly the district where we live.—*Ritter*.

Immediate environment—The city (Oswego).

Note.—Accepting the definition, "Geography is the study of the earth in its relation to man," there are three elements to be considered, *earth, man* and their *relation*. Two of these, earth and man, are concrete; the remaining one, relation, is abstract. Some knowledge of the concrete elements must be gained before any knowledge of the abstract element can be gained. Of the concrete elements, man (his activities) appeals most strongly to the child. Hence begin with the human element.

- A. The people (of Oswego).

Children led to state that an unusually large number of persons is seen on the streets a little before seven in the morning and just after six at night. They are going to and from their work. Children name all

places where their relatives and friends work, and then make the following classifications:

- I. Where the people work: In factories, stores, offices, banks, at trades, on boats, in their homes, in school, and in church organizations.
- II. Why the people work: To procure food, clothing, shelter, fuel, lights, furniture and furnishings, papers, magazines, books, to hear lectures, to have church privileges, to provide for sickness, old age, and to pay taxes.
Summary: The people work to procure the materials necessary to satisfy the needs of their bodies and of their minds. Their needs are many, therefore it is necessary to have many kinds of work to satisfy them.
- III. How the people go to and from their work: Most of them walk, some ride on bicycles, some in street cars, some in steam cars, some in their carriages, a few ride occasionally in hacks, and a very few ride in automobiles. Note which means requires least time and which most; which least effort, which most; which greatest expenditure of money, which least. Then which is used by the largest number of people?
- IV. How the people communicate with each other: Usually by word of mouth. Sometimes by messenger. Often by telephone. Occasionally by telegraph. Now and then by mail. Which way incurs least expense? Which least time? Under what circumstances is each generally used?

B. The streets (of Oswego). Earth element.

- I. The use of streets: Common thoroughfares for the people.
- II. Need of many streets: To accommodate many people, shorten distances, prevent trespass.
- III. Need of broad streets: To facilitate traffic, prevent accidents.
- IV. Need of paved streets: Greater ease for draft animals, larger loads may be drawn, contribute to health and beauty.
- V. Need of lighted streets: Fewer occasions for accidents, fewer opportunities for crime.
- VI. Need of clean streets: Hygienic and aesthetic values. Who may help to keep streets clean? how?
- VII. Need of shaded streets: Trees make streets cooler in summer, break the force of storms in winter, furnish homes for the birds and make the city more beautiful.

- VIII. Need of street drainage: Hygienic, commercial, and aesthetic values.

Note.—Show pictures of local streets, also of streets of other cities. Pictures of familiar scenes put content into pictures of related unfamiliar scenes, thus giving them reality and making them more than mere pictures.

C. The buildings (of Oswego).

- I. Factories mostly on the river: Waterpower and commercial highway. (The canal merges in the river.)
- II. Stores on streets near the river: Located to accommodate the people. It is the tendency of business to centralize.
- III. Banks near stores and factories: For safe keeping of moneys; for issuing and cashing commercial papers.
- IV. Dwelling houses on nearly all streets: Located to accommodate their occupants. Where are they nearest together? Where are most vacant lots?
- V. School houses located to accommodate the children: Near enough together to prevent the ills of over-crowding, also to prevent discomfort from long walks in unfavorable weather.
- VI. Churches located away from business: To avoid distracting noises.
- VII. Post office, telephone, telegraph, and express offices central: To accommodate the business men of the city.
- VIII. Railroad stations away from dwellings, etc.: To save the people from noise, dust, and danger.

Show pictures of local buildings, children tell on which streets these buildings are located, and then name any friends of theirs who may be employed in any one of them.

Show pictures of similar corresponding buildings in other places.

D. The great needs of the people:

- I. Houses to shelter their homes.

1. Lumber.
 - a. From lumber yard; location.
 - b. From lumber region; location.
 - c. Transportation from lumber region.
 - d. Transportation from lumber yard.
2. Carpenters.

Note.—Similar for brick and stone for building, and for masons to do the work.

- II. Furnishings: Kinds, source, transportation.

- III. Food: Vegetables, fruits, meats, eggs, bread, milk, cream, butter, cheese. Lead children to make the classifications, to name the sources of the different kinds of foods, and state how they are brought to us. Children name their grocer and give location of his store.
 - IV. Fuel for cooking food and warming houses.
Kinds: Coal, coke, wood, gas, kerosene. Source of each. How brought to us? Specimens of coke and different kinds of coal presented to class to be identified and named. Which kind of fuel is used most in summer? Why? Which in winter? Why? Which kind of fuel is cheapest? Which requires least time and attention? Which contaminates the air of the room most and exhausts it soonest? Show that the earth either directly or indirectly supplies all our fuel.
 - V. Clothing. Kinds: Woolen, cotton, silk, linen, leather, rubber. Name clothing of each kind seen in schoolroom. Specimens of raw material shown to class. Sources of raw material. What kinds come from the plant world? What kinds from the animal world? When do we most need woolen garments? When most need cotton? When rubber?
 - VI. Lights for our homes.
Kinds: Oil, candles, gas, electricity.
Source of each. Which is cheapest? safest? cleanest? most hygienic?
 - VII. Water supply. Source: Importance of pure water.
 - VIII. Means of travel and transportation: Wagons, sleighs, bicycles, automobiles, street cars, steam cars, canal boats, vessels. For what purpose is each kind most used? What kinds are not usable in summer? What kinds are not usable in winter? Which have been longest in use? Which have been recently introduced? Show pictures of colonial pleasure wagons, of horse cars, of "packets" on the Erie Canal, and of early railroad coaches and the "Empire State Express."
- E. Surface features of the city (Oswego).
- I. Hills: Location with reference to the (Oswego) river and the lake (Ontario).
Normal Hill studied in detail: Its slopes: their number, direction of slopes, uses, comparative lengths, comparative steepness, relation of each to drainage and insolation. Water-partings found and defined. Children name streets that extend up and

- down the slopes, also those that extend across. Desirability of homes on slopes. Why? Normal Hill modeled in sand and outlined on blackboard.
- II. Plains: Location with reference to the river, lake, and hills. Uses. Streets that cross plains north and south, east and west. Desirability of homes on plains. Why?
- III. Hills and plains compared:
In height, extent, drainage, moisture in soil, fertility, healthfulness, beauty of outlook, relation to river and lake, desirability for residence.
- IV. Oswego River: Location with reference to the city; direction of flow and why? means of crossing (number of bridges, use of each, how crossed before bridges were built—in summer, in winter). Pictures of noted bridges shown, comparisons made. Mouth of river, the harbor. Uses of the river: Water-power, water supply, commercial and aesthetic values.
- V. Lake Ontario: Location, uses.
- F. Industries: Attention is called to the leading industries of the city, and those nearest the practice school are studied in detail. The Box Shop, Diamond Match Factory, National Railway Steel Spring works, Kingsford's Boiler Works, Oswego Starch Factory, Conde's Knitting Factory, Ames' Iron Works, Dairy Supply Plant, Chemical Cold Storage. Excursions when possible.
- I. Detailed study of the Diamond Match Factory.
1. Location with reference to Normal School building and the lake.
 2. Articles manufactured. (A box of Diamond Matches in class.)
 - a. For what purpose?
 - b. What was used before matches? By civilized people? By Indians?
 - c. Benefits derived from the invention of matches.
 3. What materials are used?
 - a. Where obtained?
 - b. How brought here?
 4. Where are the matches shipped for sale?
 5. Number of men, women, boys, and girls employed. Importance of this industry to Oswego.
- G. The adjacent country.
- Note.*—Note the location of country with reference to city, the streets

that lead to the country, means of conveyance, different ways of reaching the country, and different means of communication.

I. The people.

1. What they do in spring:
 - a. Trim fruit trees. Why?
 - b. Make maple sugar.
 - c. Mend fences thrown down by winter winds and frosts.
 - d. Prepare the soil for crops; by plowing to make the soil deep; harrowing to make it fine; fertilizing to make it rich; ditching to make it sufficiently dry. Illustrative material: Pictures of a sugar camp and of sugar making. Pictures of farm implements which may be obtained from the manufacturers for the asking.
 - e. Plant potatoes, corn, pumpkin seeds.
 - f. Sow wheat, rye, oats, barley, garden seeds.
 - g. Make and sell butter and cheese. An excursion to the plant of the Dairy Supply Company. Specimens of the different grains, thrashed and unthrashed, shown to class. Show pictures of farm industries.
2. What they do in summer.
 - a. Cultivate crops: by plowing to loosen the soil and kill weeds; by hoeing to give the roots a greater depth.
 - b. Pick and sell small fruits.
 - c. Harvest hay and grain; thrash grain, sow buckwheat.
 - d. Make and sell butter and cheese.
 - e. Raise poultry.
Use specimens and pictures.
3. What they do in autumn.
 - a. Harvest the remaining crops: grains, root crops, garden vegetables, fruits.
 - b. Make and sell cider.
 - c. Market hay, grain, and fruit.
 - d. House the farming implements. Why?
 - e. Make and sell butter and cheese.
 - f. Sell poultry (Thanksgiving).
Excursion to Chemical Cold Storage.
4. What they do in winter.
 - a. Care for the stock.
 - b. Prepare fuel (wood).
 - c. Market hay, potatoes, cabbage, butter, poultry.

Children should be led to see that the farm work changes as the seasons change. This work underlies the study of climate and climatic effects on life.

- H. Dependence of the city people upon the country.
 - I. For food for ourselves: vegetables, fruits, grains, meats, dairy products, eggs, maple sugar and maple syrup, and honey.
 - II. For food for our animals: fodder and grain.
- I. Dependence of the country people upon the city.
 - I. Market for their products.
 - II. For articles which they cannot produce; such as tea, coffee, rice. Why?
- J. Advantages which cannot be had in the city.
- K. Advantages which cannot be had in the country.

THE WORLD AS A WHOLE

After home geography, the study of the children's environment, a series of lessons on the world as a whole is given to teach (a) the shape of the earth; (b) that the shape of the earth in part determines the hot, temperate, and cold belts; and (c) that every region studied may have its proper world setting as well as its local setting.

A large globe, the larger the better, for class use, and small globes for individual use, are indispensable. The children's home (Oswego), the Oswego River, and Lake Ontario are located first, care having been taken to have the globe so placed that the north pole points north. The first region studied is Alaska. Reasons: It is far north and therefore has a cold climate; the aborigines live primitive lives which appeal to the children; it is a part of our continent, and is under our flag.

- A. Alaska. Work introduced by a consideration of seal-skin.
 - I. Seal-skin.
 - 1. Show some article of seal-skin.
 - a. Children tell what things are made of seal-skin. Show pictures of seals. Note their geographical environment. Let children determine the weather and state what season of ours it is most like. Teacher says that where the seals live snow and ice are found throughout the year. Location of region from which seal-skin is obtained. This region is called Alaska. Direction of Alaska from Oswego. Children point and walk in this direction.
 - b. Story of seal fisheries told by teacher, reproduced by children orally and in writing.

2. Climate of Alaska. Compared with climate of Oswego.
3. Plant life: Kinds, quantity, quality. Compared with plant life of Oswego.
4. Animal life: Kinds, their food.
N. B.—Throughout the work lead children to compare the new with the related old.
5. People. Show picture of Eskimos.
 - a. Their houses: materials, plan.
 - b. Their food: kinds, how procured.
 - c. Their clothing: material, source, styles.
 - d. Their fuel: material, source.
 - e. Their lights: what used.
 - f. Their means of travel: snow shoes, boats, dog sledges, reindeer sledges.
 - g. Comparative distance of their home from ours.
 - h. How and by what routes are seal-skins brought to us. Time required.

Use pictures and blackboard drawings freely.

Read Jane Andrews' story of Agoonack, in *Seven Little Sisters*.

Note.—Further work on Alaskan products may include,—

- II. Gold. Show some article of gold, preferably a gold coin. Children tell what other things are made of gold. Show pictures of the mining regions. Story of perils and hardships incident to a journey to these gold fields. How gold is brought from Alaska to San Francisco and what is done with it.
- III. Salmon, salmon fisheries, Yukon River (locate on globe). Material used: Picture of salmon, unopened can of Yukon River Salmon, pictures of various stages of the industry. Story of the salmon fisheries reproduced orally and in writing. Tell children that Alaska is a part of our own country; that we bought it thirty-nine years ago, and paid a great amount of gold money for it. (\$7,200,000. Purchased of Russia in 1867.)
Summary of work on Alaska in lecture room with lantern slides.

Children have learned that the average weather of peninsular Alaska is similar to the average winter weather of Oswego. They have seen the effects of such weather on plant life, animal life, and on human activities

and human development. The rigors of the climate have kept the race in its infancy, and reduced life to mere existence. Their primitive ways of doing things are of greater interest to children than are the most intelligent ways of a civilized people. The Eskimo's hut, clothing, and reindeer sledge are more attractive than the banker's residence, Parisian costumes, and the "Southwestern Limited."

We next introduce the study of Mexico, whose narrow coastal plain has continuous weather similar to the hot summer weather of Oswego.

B. Mexico. Work introduced by a consideration of coffee.

- I. Coffee. Show sample of unroasted coffee, also of roasted and ground. Uses of coffee. Show pictures of coffee trees, a coffee plantation, coffee culture in Mexico. Children note the geographical environment, decide the kind of weather, and when we have similar weather. Teacher states that where coffee grows it is warm all the year round. One place where coffee grows is Mexico.
 1. Location of Mexico on globe. Direction from Oswego.
 2. Story of coffee culture; reproduced by children.
 3. Climate of Mexico: Coastal plain where coffee grows.
 4. Plant life: Kinds, quality, quantity.
Emphasize plants peculiar to the region. Compare with plant life of Oswego and with plant life of Alaska. Account for difference.
 5. Animal life: Kinds peculiar to the region. Show pictures. Their food. Their use to the people. Compare with animal life of Oswego and Alaska. Reasons for differences.
 6. People: Show pictures of Mexican Indians and of the upper classes; of the houses of the different races, note material and plan of each. Consider peculiar food, styles of dress, means of travel.
 7. Locate Vera Cruz on globe. Compare with Oswego with reference to location, size, age, etc.
 8. How may coffee be brought from Vera Cruz to New York, and from New York to Oswego? Routes traced on globe. Time required for transportation.
 9. Directions and distances of Mexico and Alaska from Oswego compared. Children point and walk in each direction.
- Study of Mexico may be continued by considering,—

II. Vanilla, vanilla culture, uses.

III. Mexican hammocks, material used, uses.

Summary of work on Mexico in lecture room with lantern slides.

After Alaska and Mexico have been studied, take up,—

C. Valley of the Amazon: India rubber, Brazil nuts.

D. La Plata Valley: Leather, wool.

N. B.—Children have found a cold region far north of us, and a hot region far south. Now they discover that south of the hot region is a region similar in climate to our own.

E. Siberia. Furs: Sable, otter, ermine. Children note location of Siberia with reference to location of Alaska. Trace on globe from Siberia to Alaska and, in same direction, from Alaska to Siberia. Note that similar climate prevails. Hence a cold belt in the far north encircling the earth.

F. Switzerland: Cheese, music boxes, Swiss carving.

G. France: Silk.

H. Spain: Cork, olives.

I. China: Tea, fans, fire crackers.

Children note location of Switzerland, France, Spain, and China with reference to their own home. Trace on globe and discover that a temperate belt south of the cold belt encircles the earth.

J. Central Africa: Ivory. Compare the location of Central Africa with location of Amazon Valley. Trace the hot belt that encircles the earth.

K. South Africa: Diamonds. Compare location of South Africa and La Plata Valley, and trace the south temperate belt that encircles the earth.

South of the south temperate belt is a cold belt similar to the cold belt which includes Siberia and Alaska, but this cold belt has but little land, and no people.

Note.—In the study of the world as a whole, emphasize the geographical elements, notably climate, its effects on plant life, animal life, and human industries. Consider transportation routes, means of transportation in different countries, the commercial cities and sea ports. The work of comparison should be frequent and thorough.

(To be concluded)

GEOGRAPHY AND LIFE

By W. J. SUTHERLAND

State Normal School, Macomb, Illinois

THE leading consideration concerning all life is self perpetuation. The inalienable right to live is the most impressive thought revealed in nature. Dearness of life is the sole cause of the universal conflict in the organic world. A superficial glance at nature reflects the harmony and tranquility of a "daisied field in June," but a more careful scrutiny convinces us that the realm of nature is the scene of a warfare "utterly shameless and utterly cruel." "Long life and length of days" come only to the creature whose environment is favorable to its needs. Either organisms find desirable homes and congenial company, or vanish from the earth altogether. The security of life is contingent upon environment. The interesting adaptations of plants to secure sunlight, water, and food; and of animals to secure food, and for rivalry and defence, establish the fact that dependence characterizes every organism by determining its nature.

Animals derive food either directly or indirectly from plants, for they alone possess the important function of organizing inorganic materials. Since the two kingdoms must occupy the same dominion, the struggle for existence is made more intense. But plants, in turn, are dependent upon proper conditions of temperature, moisture, and soils. The temperature of any region leads to a consideration of the sun and its effect upon earth and atmosphere; moisture takes into account the aqueous envelope as affected by heat and winds; and soils result from the combined action of all these factors and forces upon the rock crust of the earth. Plants do not thrive in regions where the temperature remains long at or below 32°, as water is necessary to dissolve and transport nourishment. A meager precipitation of moisture, for a similar reason, stunts plant growth; but with sufficient moisture and a high temperature, there is scarce a region in the world that would not "blossom as the rose."

A consideration of man's distribution and development reveals positive evidence of his response to physiographic conditions. Temperature and moisture are chief among these, not only because they affect him directly, but because they determine the productiveness of habitable areas. The progress of civilization leads to the conclusions (1) that range and variation in climatic conditions are favorable to civilization and culture, and (2) that extreme and uniform conditions are unfavorable to the advancement of civilization.

Tropical regions support a luxuriant vegetation in response to high temperature, liberal rainfall and alluvial soils. The food supply is generous and were it not for other less favorable conditions a dense population might flourish. The range of temperature is scarcely more than ten degrees, and, in addition to the enervating influence upon human beings, it permits an uninterrupted plant growth, insuring abundant food with but little expense of human energy. The rank vegetation becomes a barrier which man declines to penetrate, partly because intertwining plants and vines obstruct his path, and partly because this tropical verdure harbors a dreaded animal and insect life. Resistance to life, so far as food and shelter are concerned, is reduced to the minimum; the palm alone may furnish all that human life demands for mere subsistence. Excessive heat causes man to languish in the shade; excessive moisture breeds disease and makes cultivation difficult. The uniform climate and unlimited varieties in vegetation become monotonous and oppressive. Plant life holds the scepter! Man is over-awed with the fierceness and regularity of environing conditions. Long subjection has brought with it resignation and mental decadence. What wonder that the infantile mind should reverence forces so irresistible as scorching suns, angry skies, gigantic trees and ferocious beasts! What wonder that man should abandon a struggle for supremacy in which the odds are so against him!

Civilization is also in a low stage in the Arctic Regions. The Eskimo's struggle for existence is so intense that all human effort is expended in extorting from nature a meager support. If we reflect on the conditions of his environment, we shall discover the most depressing monotony: the long silent night with only lurid gleams of light; the illimitable expanse of glacier ice; the absence of vegetation; the desolate climate; the few species of animal life; surely, his is a "universe of sky and snow." Here, again, nature outbalances man, and ambition is weighed down by conditions so monotonous, that no excitations appeal to him except those for food and shelter. Even the food that he eats so lacks variety that the building up of a sensitive and susceptible organism is impossible. He is as stolid as the world in which he dwells. Being driven for long periods to his home by the rigors of the clime, his emotional nature responds to enforced retirement and hence he manifests a strong love for home and family. Surely his is a case of arrested development; growth in intelligence demands at least some surplus energy after a mere livelihood is insured.

Temperate regions are characterized by a great range of temperature and a varying supply of moisture. A rigorous climate demands well built homes and warm clothing; short summers demand great activity in order

to mature crops; indigenous food-plants do not abound; soils produce only when carefully cultivated; woods are relatively scarce; metals are abundant but often difficult to obtain; and mountain barriers frequently separate productive areas. The variety of influences in environment demands versatile and symmetrical development. Even sudden weather-changes stimulate mind and body. Life becomes abundant only when it establishes many relations. Intellectual life is quickened in the consideration of that which is economical and advantageous. Rivalry and competition make life strenuous. Just as the equable temperature of the Tropics minimizes man's needs and leads to responses that are uniform, so the temperate realm multiplies the necessities of life and brings a variety of responses. The high temperature of summer, following a severe winter, is a powerful stimulant, and the reactions which lessen the tension come in the form of linen clothing, electric fans, manufactured ice, open cars, railroads to mountain retreats and seaside resorts. So millions of men are busy because the sun has mounted higher in the heavens.

According to Herbert Spencer life is the process of establishing an equilibrium with environment. The more intricate and complex the equilibrial processes become, the higher the degree of life and the higher the scale of civilization. In low forms of life the adjustments to environment are simple, and the accommodations are largely effected by the organisms themselves. Every animal must respond to the demands for food and protection from enemies, or become extinct. The tropical inhabitant adjusts himself to his surroundings almost completely; he lives in caves or in the shelter of trees, wears little clothing and subsists on fruits, roots and insects. He is a direct response to an equable climate and a highly productive soil abounding with indigenous food-plants. Provision for the future is unnecessary, hence irresponsible and indolent habits are consequent reactions. Inactivity and stupidity are direct responses to conditions that make life easy. So nature, here violent and monotonous, outbalances a manhood that places little value upon an existence that is so generously bestowed.

Re-creation of environment is the test of enlightened civilization. In the lower stages of civilization, man stooped to adjust himself to nature and so became enslaved; but in highly civilized races, men have developed tastes and needs which nature, alone, cannot satisfy. So human ingenuity and discovery are summoned to transform material resources, and the work of nature is consummated with an artificial touch, which makes it serve more perfectly, a fastidious people. All arts and industries, all crafts and trades have, in the end, a single function to perform; viz., the promotion of natural resources to greater usefulness. But all modifications of material

resources demand an intellectual alertness which marks progress in civilization.

It is interesting to trace out the history of localized industries, and one is soon convinced that favorable productive conditions coupled with advantageous means of distribution, are the determining factors. To one who has studied geography aright, it is unnecessary to explain why cranberries are grown on Cape Cod, tobacco in the Red Sandstone Valley of the Connecticut, rice in South Carolina, or wheat in Minnesota; or why locomotives are made in Philadelphia, plate glass in Pittsburgh, furniture in Grand Rapids, cotton goods in Birmingham, or pottery in Trenton. Suffice it to say, that industries slowly but surely spring up in the regions well suited to their development. Frequently, where conditions are adverse, men triumph over nature's barriers to civilization, as when they tunnel mountains, connect oceans with watery threads, turn the course of rivers and moisten arid lands. Nature deals out her wealth with moderation in temperate zones and to them only who would "subdue and have dominion" over her. Life is dear because it has been purchased by incessant toil, and it is versatile and abundant because, in the struggle, it acquired knowledge, sympathy, judgment and mercy.

The trend of industrial history is determined by physiographic conditions. Man can modify his environment but he cannot annihilate it. In general, prosperity is coincident with a wise adjustment to geographic conditions. Chief among these are climate and soils of which much has been said. But land forms, themselves, exert important controls over industrial life. A general distribution of mountain ranges parallel to seas makes narrow coastal plains; close parallel ranges enclose inter-montane valleys; in the midst of the sea, volcanic disturbances project habitable lands; the subsidence of continental margins is responsible for numerous head lands and adjacent islands; and great rivers build and moisten far-reaching food plains. Hence it is that these earth processes fashion restricted habitable areas, while unrestricted areas result from the evaporation of large water bodies, or from the diastrophic tilting or lifting of extensive sea-floors. Broadly speaking, habitable lands are restricted or unrestricted and a review of industrial life makes the following inductions possible: (1) Restricted habitable areas determine industries in which a maximum of labor is expended in the production of a minimum of material. (2) Conversely, unrestricted habitable areas determine industries in which a minimum of labor is expended in the production of a maximum of material.

The operation of this principle is reflected in the character of the people. The Norwegians, hemmed in between the mountains and the ocean, were

long dependent upon the fishing industry, and years at sea developed them into the boldest and most famous of seamen.

When a yard of Belgian hand-made point-lace is sold, ninety-five per cent. of the purchase price is for labor; the value of the raw material used is insignificant. In order that nearly five hundred people may live on a square mile, the highest possible utility must be given every production, by the expenditure of much labor upon little material. In Switzerland, where metals and woods are scarce, hand-made watches and ingeniously carved toys illustrate how a dearth of material may be transformed into great wealth through the application of much industry. Unusual skill, strict economy, and extreme perseverance are the characteristic responses in the people. Restricted tillable areas near Boston and New York stimulate truck-farming because an acre so employed furnishes a maximum of labor, the compensation for which comes when a limited quantity of choice seasonable vegetables finds a ready market.

Not only to industrial life does the principle relating to restricted areas apply, it extends also to political history with most decisive results. As England's tillable lands are much restricted, her own soils have long been unable to support her rapidly increasing population. In 1815 the Corn Law was passed to protect the English landlord. Under this obnoxious measure, the price of wheat in 1817 reached \$3.25 a bushel, and the same year the weekly wage of a weaver was \$1.02. The struggle for free trade soon followed. The exorbitant price of wheat added to the misery of the under-fed laborer, and the tariff interfered with commerce. Manufacturers demanded free trade because they saw clearly that a more abundant food supply would increase the spirit and efficiency of the workmen, and would also tend to keep labor cheap. Had England's territory been sufficient to furnish food for her millions, the great political struggle that wrenched the very life of England, might have been averted. The misery, suffering, and abject poverty of the people enlisted the sympathy of noble hearts, who condemned a policy that caused "wealth to accumulate and men decay." Poets, reformers, and statesmen championed the cause of suffering humanity, and finally in 1846, Robert Peel through motives altruistic, or otherwise, deserted the Tories and introduced the bill which sealed the doom of the Corn Law and marked the beginning of free trade of England. So in America, geography is peculiarly interwoven with history. The coastal plains, with their rich soils and warm moist climate, must answer for the Civil war, says Prof. Davis, for these conditions made slavery profitable. Ultimately, the economic resources of the South are responsible for the direful social and industrial situations of the present day.

In areas where the resources are unrestricted, the industrial problem is very different. In contrast to the Swiss, who makes a few ounces of metal into a watch worth ten dollars, or the Belgian, who converts a handful of flax into a yard of point-lace worth its weight in gold, the Pennsylvanian makes from his unrestricted resources, iron and coal, locomotives and steel rails. The problem of the Illinois farmer is the production of a maximum yield with the minimum investment of labor. A load of corn which brings \$25, shows at least a return of \$20 for material and the balance for labor. Dealing, as he does, with produce in great bulk, he becomes wasteful and extravagant. If, instead of Illinois' eighty people to the square mile, it had Belgium's four hundred and ninety, no longer could "half a tillage stint" our prairie plains. No half-cultivated farms, no weedy fence corners, no peaty swamps or alkaline tracts could exist. Agriculture in the past has been easy. Owing to its great possibilities, "man has had only to tickle the soil with the plow and it has laughed with a harvest." But in his greed to get bountiful returns, with little outlay of labor and capital, man is fast reaching a point of limiting returns. Because of reduced fertility, a point is reached at which a given outlay of labor and capital, fails to produce a proportionate yield. Here the study of geography touches life most directly! It is only through an understanding of soils, and a knowledge of the treatment by which their fertility can be maintained, that this point of limiting returns can be pushed farther into the future. So the agricultural college becomes a necessity, and the calling of the scientist is dignified by his reduction of "farming" to scientific agriculture.

Has too much been said concerning the influence of *geography* upon life, and too little concerning the *value* of the *study* of geography as presented in our schools? The educational tendency is emphatically toward a training that touches life in practical, rational, and vital ways; hence the value of any study must be measured by its contribution to fulness of life. That man is best educated who best understands his environments, who most clearly recognizes his relationships and responsibilities to all other life, and who best uses his resources to promote the common weal. Every science deals with some phase of man's environment, and geography, which is a department of science, deals in a general way with the same subject-matter. Any study which aids in giving man the correct view of his place in nature is of great value either from the practical or the cultural point of view; for, indeed, culture to be worthy the name, must manifest itself in the everyday life of a people.

The revelation of truth is one of the chief functions of all education. Superstition and tradition have ever blocked progress. Geography has

assumed its share in the task of disseminating knowledge. A Genoese visionary, starting out to prove the rotundity of the earth, discovered a new world; Magellan consummated the unfinished task of circumnavigating the globe; the next great triumph of truth came in the middle of the sixteenth century, when Nicholas Copernicus bequeathed to science a solar system. With the contributions of Herschel, Laplace, Ritter, and Guyot, we might think the work of geography complete. But again comes the question more pointed and specific: "How can I, at the country cross-roads, influence life and character through Geography?" Seek the answer in this: shall men and women of the next generation be filled with "wisdom and understanding"; and shall they be free from the bondage of superstitions that distort and terrify life, then must the children of to-day be convinced that moons neither help nor hinder the growth of plants, nor affect the amount of rainfall; that soils, the chief source of man's wealth, are the repositories of plant-foods which unwise use may exhaust all too soon; that cyclones possess decided economic value since to them we are chiefly indebted for our copious rains; that the "magician chlorophyll, conjuring with sunbeams" breathes life into dead matter and makes an animal kingdom possible; that birds and bees labor incessantly in making man's harvest abundant; that the chief use of the earth-worm is not to veneer a fish-hook, but to enhance the resources of the soil by keeping it rich and porous; that even invisible organisms render the highest service to man, as when bacteria accomplish the fixation of nitrogen in leguminous plants; and finally, that the forest, the nature-given heritage which man has so wantonly devastated, serves man directly in a score of ways, and indirectly it enriches and protects the soils, prevents disastrous floods, secures constant heads to our streams, breaks the biting blasts of winter, and makes beautiful landscapes that otherwise would be barren and monotonous.

Even above the value of practical knowledge, the student of nature may discover the steadfastness and immutability of God's law. He may be convinced that retribution follows its transgression, in the physical as in the spiritual world, with unfailing certainty; and finally, that to him who is in harmony with nature, and therefore most likely to be "in tune with the Infinite," shall come "length of days, riches and honor."

There are still people who believe the earth to be top shaped or pear shaped. This should warn us to use a globe freely in our class rooms; to illustrate the globular form of the earth, not merely to talk about it.

EDITORIAL

THE TRAINING FOR TEACHERS OF GEOGRAPHY IN
ELEMENTARY SCHOOLS

THE teacher of geography in elementary schools has the most difficult task of any geography teacher, for she is called upon to teach the elements of a subject so vast and involved as to tax the powers of the most eminent investigators and students. A teacher in the elementary grades is expected to analyze the whole subject and to present to children in the third or fourth grades geographical relations which no one can adequately study without a preparation in many sciences other than geography. The controls that determine the geographical relations of men to one another and to their environment are the most subtle and difficult phases of geographical study. These relations, illustrated in a greater or less degree in every locality, are the best phases of the subject to receive attention in the earlier grades, and as a rule are taught by teachers who cannot be expected to have any expert knowledge of the subject. The subject matter of the upper grades is not so difficult of study or appreciation and teachers of regional or continental geography can get along without expert training in geography better than can teachers in the earlier grades.

The work of elementary teachers of geography may be divided into two parts—the teaching of the principles of geography and of regional geography. These are the two phases of the subject that, from one standpoint or another, make up the work of an elementary course of study. Those charged with the responsibility of arranging courses in geography in normal and training schools need to recognize what the future teachers are expected to know and to plan their courses accordingly.

Yet a study of the usual courses in training and normal schools would seem to indicate that these facts are not kept in mind. Training in understanding the fundamental controls of life distribution and life relations over the world can not be given through courses in physical geography alone. Important as an understanding of physical geography is in all geography teaching, no teacher is prepared to teach geography well who has not studied also the elements of plant and animal geography as related to climate, surface, drainage and soil, and of political and commercial geography as related to all the controls. Following such a study of the principles as outlined in the introduction to the usual grammar school geography, should be some training in the application of these principles to the study of some

one continent or country, to show how regional geography should be studied and approached.

These two phases of the subject would seem to be the minimum preparation in subject matter which would adequately prepare teachers to use understandingly any one of the elementary text-books.

Students who have had such training in personal study will be prepared not only to lead their future pupils to proper methods of studying geography, but will be able to appreciate and make good uses of the principles and details of a course in geography teaching. It goes without saying that no teacher can receive value from studying the methods of teaching a subject she is not familiar with. The knowledge of subject is therefore a necessary basis for the study of methods of teaching.

Common sense and the general content of school geography, as determined by courses of study and text-books, certainly dictate that we should prepare teachers in those phases of the subject which they must teach; and second that we must give them as much as we can in reference to teaching different phases of the subject in the different grades.

A rational course of study for pupil teachers would seem to include three parts:

1. The principles of geography in which physical geography should receive strong emphasis, but which cannot be confined to physical geography alone, as is so often the case.
2. Regional geography of at least one country, in which the principles of geography are applied and from the study of which power will be gained to study and teach other countries adequately.
3. The teaching of geography, which should include (a) a study of the underlying principles of good geography teaching, (b) the application of the principles of teaching, and (c) the study of the course of study and the special problems of the different grades.

Training school courses in geography need to be as closely planned for practical usage, as school courses of study do. We are constantly emphasizing the necessity of teaching geography so that school pupils will receive the best training for the comprehension and study of geography in after life. For the same reason should not the geography in normal and training schools be arranged so that the pupil teachers will be best prepared for their tasks in geography teaching in after life? Does not this mean that our courses shall be broader, deeper and less one-sided than they now are?

REVIEWS

THE ELEMENTS OF GEOLOGY.—William Harmon Norton, 461 pp., 374 Illustrations. New York, Ginn & Co., 1905.

ONE of the much-discussed problems of the present day in High School teaching is concerned with the selection of geologic and physiographic material for a course in Earth Science, the time given to the subject being from one-half year to a year. A not unreasonable solution of this problem has recently been suggested by offering a course in geology and expanding the physiographic chapter of the subject to something like the proportions, even if not the dignity, of a separate course. Besides this, the historical chapter is shortened very considerably usually on account of a lack of laboratory material, and because the interpretations, involving as they do, a combination of more or less difficult stratigraphic and palaeontologic principles, with extensive field work, are out of reach of both teacher and class. In physiography, on the other hand, distant processes and forms may be illustrated in miniature in the local field under conditions not usually prohibitive.

The above teaching conditions seem to be fairly met in Norton's *Elements of Geology*, an elementary text-book for the High School and College. The first half of the book deals with external geological agencies and their resulting forms, the quality of the treatment being suggested by the fact that this section was arranged to meet the approval of Professor Davis.

If to this chapter is added the following one on internal geological agencies and the physiographic chapter still further enlarged with the help of a good text-book in Physical Geography, a good course could be arranged.

The wisdom of the plan of giving equal treatment to all phases of the subject in an elementary course is to be doubted. In *The Elements of Geology*, minerals and rocks are treated in a very simple manner and in immediate connection with the processes and conditions which determine them. This is reasonable from a pedagogic point of view and is not inconsistent with the arrangement of College and University courses in continuation of the subject. The chapter on Historical Geology is brief, clearly written, and treats chiefly of the development of North America, and is therefore a good basis for an elementary college course, but we question whether Historical Geology should be included in a High School course at all, any more than that Conic Sections should be taught in every course in Solid Geometry. It is important to recognize that we are discussing the use and not the construction of a book, as no single book can possibly meet the complex

conditions of our school system. The diagrams in this book are very clear, and with the cuts, excellently illustrate the text, the maps representing the geography of the continent of North America in each geological period being more nearly correct than any published heretofore. This is not a matter of the technology of illustration. Compare Fig. 264, for example, with any other map representing the Physical Geography of North America at the beginning of the Cambrian. They are fundamentally different. Our present better knowledge of the distribution of these rocks and their relation to the previous terrane is here cartographically expressed for the first time. The questions at the end of each chapter are unusually suggestive and effective, and should form an important part of the instruction.

The frequent errors of terminology and composition illustrated on pages 87, 89, 93, 96, 98, and 101 are regrettable, but, except in a few cases, do not lead to confused ideas on the subjects treated and therefore should not be taken too seriously.

I. B.

ECONOMIC GEOLOGY OF THE UNITED STATES.—Heinrich Ries, 8vo. New York, The Macmillan Co., 1906.

In the teaching of geography much emphasis is of necessity placed upon the economic resources of the various countries. The agricultural products are naturally those given especial prominence but as time has gone on the mineral wealth has come more and more into the foreground. This is particularly true of the United States whose output of coal, oil, iron, copper and lead is in each case foremost in the columns of the statisticians and whose gold and silver are but slightly inferior.

In order that a teacher may clearly and correctly place before a class the mineral products of each country it is necessary for him or her to have some knowledge of geology and to view these matters from a geological standpoint. The book before us does this, and gives a brief but succinct description of the modes of occurrence and distribution of practically all forms of mineral resources in the United States. The subject matter is well illustrated by maps, and the reader will readily gain good ideas of distribution and occurrence. The United States are alone treated but the occurrence of the metals and non-metallic minerals within their borders is typical of the rest of the world as well.

Starting with a basis such as the work before us affords, and year by year amplifying it with the statistical reports like the Mineral Resources of the United States Geological Survey, and the Mineral Industry of the Engineering and Mining Journal, the teachers of older classes will be able to present this side of geography with all the necessary fulness, interest and accuracy.

J. F. K.

RECENT PUBLICATIONS

THE WORLD ALMANAC AND ENCYCLOPEDIA FOR 1906. The Press Publishing Co., New York, 1905.

The recent annual World's Almanac, like its predecessors, is an indispensable reference volume for the thousand and one items of geographic information which are rarely needed but which are needed badly at times.

BIBLIOTHECA GEOGRAPHICA, Vol. X, 1901. W. H. Köhl, Berlin, 1904.

The latest annual Bibliotheca Geographica, like its predecessors is a full bibliography of geographic literature for the year reviewed. Includes all phases of geography and is a necessary reference volume for specialists in geography.

EUROPE AND THE MEDITERRANEAN REGION. J. B. Reynolds, pp. 128. London, A. & C. Black, 1905.

A brief digest of the geography of Europe in general and the Mediterranean countries in particular, excellently illustrated by cuts and maps. Written by an expert teacher with a strong emphasis of causal relations. Valuable for reference in the upper grades in American schools.

ARTICLES IN THE 'CURRENT GEOGRAPHICAL
MAGAZINES

THE DELTA OF THE RIO COLORADO, by D. T. Macdougall, *Bulletin, American Geographical Society*, January, 1906.

An interesting illustrated account of the little known delta of the Colorado river, including the plant life and Indian inhabitants.

THE FLORIDA KEYS, by John Gifford. *National Geographic Magazine*, January, 1906.

An illustrated account of the Florida Keys, describing the route of the railroad now under construction to connect Key West with the main land. Describes the products and agricultural conditions of the Keys and includes excellent pictures of sponges, green turtles and alligator eggs.

THE SPHERE AND USES OF GEOGRAPHY, by Sir C. R. Markham, *Geographical Journal*, December, 1905.

A summary of the value of geographic training in the education of all.

NOTES ON THE HISTORY OF THE NILE AND ITS VALLEY, by W. F. Hume, *Geographical Journal*, January, 1906.

A description of the Great Plains of the Sudan and of the Cataracts.

THE GEOGRAPHICAL CYCLE IN AN ARID CLIMATE, by W. M. Davis, *Geographical Journal*, January, 1906.

An analysis of the development of land forms in an arid region, contrasted with the cycle in humid regions.

NOTES

RECENT DECISIONS OF U. S. BOARD ON GEOGRAPHIC NAMES.

Big Flats: Town, Chemung county, New York. (Not Bigflats.)

Blocton: Town, Sibb county, Alabama. (Not Blockton.)

Gorham: Mountain, Mt. Desert Island, Hancock county, Maine.

Icicle: Stream emptying into Wenatchoe river, near Leavenworth, Chelan county, Washington. (Not Nacicle.)

Ignacio: Lakes west of Animas canyon, La Plata county, Colo. (Not Bishop, Columbine, Hamor, Molar, Pierce, nor Rockwood lakes, nor Cascade reservoir.)

Katalla: Bay, river, slough, and town, Alaska, near Controller bay, Gulf of Alaska. (Not Catalla nor Catella.)

Navajo: County, creek, reservation, spring, town, and valley, Navajo county, Arizona. (Not Navaho nor Navajoe.)

Uinta: County, mountains, reservation, river, town, and valley, Uinta county, Utah. (Not Uintah.)

*Wetumpka: City and precinct, Elmore county, Alabama. (Not Wetumka.)

CURRENT ARTICLES ON COMMERCE AND INDUSTRY.—

January:

Adulteration: How Housewives Can Tell Adulterated Foods, *Ladies' Home Journal*.

Austrian Textile Industries, *Consular Rep.*, Dec.

Camphor Monopoly by Japan, *Consular Rep.*, Dec.

Cattle Statistics of the World, *Hide and Leather*, Jan. 27.

Chinese Empire (styles, copper coins, mints, salt, tea) *Consular Rep.*, Dec.

China, The Awakening of, (Ill.) *World's Work*.

Cotton-growing: Report of Brit. Cotton-Growing Ass., *Consular Rep.*, Dec.

Electro-Technical Industries, *Sci. Am.*, Jan. 20.

Farming as a Business Enterprise, *Rev. of Revs.*

Fruit Growing, Tropical, in Florida, (Ill.) *Country Life in Am.*

Gold, The Increasing Supply of, *Moody's Mag.*, Dec.

Investors, Small, Guiding Principles for, *World's Work*.

Korea, Japanese Seizure of, *World To-Day*.

Linseed Oil, *Paint Oil and Drug Rev.*, Jan. 3.

*Reversal of former decision.

Lumbering: White Cedar and Hemlock, *Miss. Valley Lumberman*, Jan. 12.

Lumbering: The Advent of Yellow Pine, *Miss. Valley Lumberman*, Jan. 26.

Porto Rico, Labor Conditions in, *Bull. of Bureau of Labor*, Nov.

Porto Rico, Our Experience in, (Ill.), *World's Work*.

Railway: The Private Freight Car System, *Sat. Evening Post*, Jan. 6 and 20.

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HYGIENE IN THE TROPICS.—Under the special conditions of tropical climates, the resident who comes from a cooler latitude needs to take special precautions regarding his mode of life and personal hygiene. A rational temperate mode of life, especially the avoidance of alcoholic excess; regular exercise; non-fat-producing food; clothing suited to the climate, such as duck or linen for outside garments during the day and light woollen for the cool of the evening and night; careful attention to the site and construction of dwellings; all possible sanitary precautions; keeping cool during the warmest hours and season by the use of fans or punkahs, by frequent baths and by abstaining from hard work; protection against mosquitoes by means of screens; frequent change of climate by returning to cooler latitudes,—all these are important. It seems like a contradiction, but it is a fact, that the danger of taking cold in the tropics is very great, and must be carefully guarded against. General Wolseley is reported to have said of the tropics, "not to get cold is to avoid almost certainly all the causes of disease," and a recent writer has well said that these words should be inscribed on the walls of all barracks in the tropics. The situation may be summed up in the rule: "Respect the sun, and rain and wind; clothe with a view to avoiding chill, and live temperately." The danger of becoming chilled is greatest during the cooler hours of evening and night; during rains, or when cool winds blow. The skin does not react well in the tropics, hence chills are frequent with even slight temperature changes, especially when there is wind. As to the best style of dwelling for the tropics, there is no absolute agreement. The material can best be determined by the local conditions in each case: wood, stone and thatch are employed successfully.—*From the Hygiene of the Zones, Bulletin Geographical Society of Philadelphia, January, 1906.*

SOME GENERAL RELATIONS OF CLIMATE AND HEALTH.—From earliest times people have sought in atmospheric conditions an explanation of the occurrence of disease, and have often found in statistics of mortality and of weather a more or less striking parallelism. Many fairly obvious large facts naturally point to some relation of cause and effect in this matter. Some diseases are found principally in the warmer climates; others seem to prefer the colder. Some are usually more active in the warmer, or the dryer, months; others have shown the contrary relation. Higher altitudes are free from some diseases which prevail near sea level and have certain favorable climatic characteristics long recognized in the treatment of disease. The pure air, increased respiration and deeper breathing are stimulating and health-giving; beneficial in many affections of the lungs, although occasionally over-stimulating in nervous and cardiac troubles. In the case of other diseases, again, altitude has no effect. Dry climates, especially deserts, whose air is usually exceptionally pure and aseptic, are generally healthful, and are beneficial in many cases where mountain climates are too stimulating. The climates within forested areas have proved especially favorable in cases of phthisis. Ocean air, pure and dust-free, with its saline constituents and equability of temperature, is beneficial to most persons as a moderate tonic and as a restorative in many illnesses. Winds are important agents in promoting health. The cool, refreshing sea-breeze of the tropics brings in pure air from the sea and is one of the most important desiderata in hot climates. Winds are active ventilating and purifying agents where population is congested. Fogs and clouds, by cutting off sunlight, weaken one of the best agents in promoting health, for the germicidal action of sunlight has been proved by many investigators. Sternberg has called it "one of the most potent and one of the cheapest agents for the destruction of pathogenic bacteria," and says "its use for this purpose is to be recommended in making practical hygienic recommendations." In London, a higher death-rate after a long fog may, however, result from the lower temperature during the fog, and not from any direct effect of the fog itself.—*From the Hygiene of the Zones, Bulletin of the Geographical Society of Philadelphia, January, 1906.*

THE HUMAN ELEMENT IN GEOGRAPHY.—The studies of the Educational Research Club of Hartford county, Conn., show that boys and girls, particularly the latter, dislike geography. Schoolroom experience teaches about the same thing, or, to be more exact, it teaches that a very few like the subject, that a good many dislike it, and that a great many regard it with indifference. The subject is not difficult enough to be cordially hated, and is not interesting enough to be generally liked.

But geography is not inherently uninteresting. It is only the victim of shabby treatment. The child revels in particulars, and fights clear of condensed statements of fact. Many books prepared for his use, however, are mere summaries of what it would take a small library to contain in readable form. There is much more wisdom in such books than in the writing of them. They would take the child by flying leaps from peak to peak of towering knowledge, without permitting him to tread the intervening path with his own feet. And what of it? Well, he doesn't leap, that is all. He likes the touch-and-go movement, but cannot be expected to vault six-foot fences or clear twelve-foot ditches. Besides, great geographical facts follow each other in such rapid succession that the mind is not applied to any one long enough to overcome the inertia of interest.

The child wants to know what people are doing and how they do it. To tell Southern boys and girls that the winters of Iowa are cold is only a cold statement of a cold fact, and it is coldly received. But tell them how the snows of winter affect the life of the people—how they dress and build to keep warm, how they travel over the snow, what sports the children have—tell them about people, large and small, and the feeling of kinship will spring up and do the rest.

Yes, it would take a dozen large volumes to hold all the geographical knowledge, thus elaborated, that is now crowded into our courses of study. But it would require only one small volume, even when written in a diffuse style, to contain as much as the average child gets out of our multum-in-parvo courses. What the child can learn is not to be measured in typographical ems. Nor is it to be inferred, because he cannot digest a pound of dry bone in nine months, that he cannot digest twelve pounds of meat in less time. If geography were written in an attractive way, the child would read many times the number of pages he now reads, and understand the subject better without the teacher's assistance than he now does with it.

Let us have a little more human life in our geographies, even if they do cost more. The book that awakens interest is cheaper at any price than the one that does not.—*Journal of Education*.

A VOCABULARY OF JAPANESE WORDS OCCURRING IN GEOGRAPHIC NAMES

A. Adjectives.

shiro (shira)	= white
kuro	= black
aka	= red
a'o (awo)	= blue
ki	= yellow
midori	= green
ô (ôki), tai (dai)	= great, big

ko, shô	= small, little
takai, taka	= high
hikui	= low
yoko	= transverse

B. Words denoting location.

higashi, tô	= east
nishi, sai, (se'i)	= west
minami, nan	= south

kita, hoku	= north
kami, jo	= upper
shimo, ge	= under, lower
naka, chû	= between, middle
ma'e, zen	= before
ushiro, go	= after, behind

C. The land.

kuni, koku (goku) or shû	= country, province
tai-riku	= continent
ken	= department, district
kori (gori)	= county
shima (jima), tô	= island
han-tô	= peninsula
yama, san (zan)	= mountain
nobori	= same, in Aino language
san-miya'ku	= chain of mountains (literally: pulse of mountain)
yama	= wild, (literally mountain-grown) in names of wild flowers, animals etc.
mine	= summit, crest
take (dake)	= high peak
tôge	= mountain pass
saki (misaki)	= point, promontory
sakai	= boundary
tani (dani)	= valley
hira (hirachi) hêgen	= plain, lowland
taira (daira)	= same, in a few special names
hayashi	= forest
mori	= grove
hara, no (nohara)	= an opening in the forest
numachi	= bog
ta	= rice-field
inaka	= country (contr. to city)
jôka	= residential city (of a daimio)
miyako, fû	= capital
machi	= street, town
mura	= village

shiro	= castle
goten	= palace
tera (dera)	= temple of Buddha
miya	= shinto temple

D. Fresh water.

minamoto, suigen	= river
kawa (gawa), ka	= spring, source
kuchi (guchi), kako	= mouth
taki (daki), bakufu	= waterfall
yama-midzu	= mountain stream
tani-gawa	= same
taika (taigo)	= large river; more frequently the prefixes ô and ko denote the size, as ô-kawa or ko-gawa
hori	= canal
midzu-umi, kosui (ko)	= freshwater lake
kata (gata)	= lagoon pond
ura	= bay
ike	= pond
numa	= swamp
ide-yu (onsen)	= hot spring
yu	= hot water
midzu	= cold water
jigoku	= hell, solfatara

E. The ocean.

O-nada, tai-yo (tai-kai)	= ocean
umi, kai	= sea
uchu-umi (naka-umi)	= inland sea
iru-umi, ura (wan)	= bight
nada	= part of the ocean, bight
seto, kai-kiô	= straits
minato (tsu), kô	= harbor
hama	= flat, sandy shore
shio	= ocean current, tide
kuro-shio	= Jap. Gulf stream
oya-shio	= cold Kurile current
hiki-shio	= flood tide
michi-shio	= ebb tide

REMARKS

- 1. *a, e, i, o, u*, are sounded as in Latin.
- 2. Two vowels are always sounded separately: *tai=ta-i, se'i=se'-i*.
- 3. No vowels are mute: *ike* is two-syllabic.
- 4. A circumflex over a vowel: *â, ê, î, ô, û*, means a long sound.
- 5. *taki (daki), kuchi (guchi)*: when words beginning with *t, k, s*, or *h*, follow a vowel in a compound name, *t* changes into *d*, *k* into *g*, *s* and *sh* into *z*, *ts* into *dz*, *ch* into *j*, *h* (*f*) into *b*.
- 6. *Miyako, fû*: With the introduction of Buddhism and Chinese civilization, a great many words of Chinese origin were naturally introduced into the Japanese vernacular (*Yamato-kotoba*). These words, which have preserved the Chinese spelling but whose pronunciation is entirely different from the Chinese, form the *Sinico-Japanese* constituent of the language. Many objects have both a *Yamato-kotoba* and a Chinese name. In all cases occurring above, where two names are separated by a comma, the word *before* the comma is the *Yamato*, the word *after* it is the *Sinico-Japanese* name.

Adapted from Rein's "Japan," 2nd edition, 1905.—*M. K. G.*

SOURCES OF THE COFFEE SUPPLY.—The origin of coffee is lost in the mists of antiquity, but the plant is believed to be a native of Abyssinia, and to have been carried thence into Arabia early in the 15th century. From Arabia the Meccan pilgrims carried it to all parts of the Mohammedan world. Americans are by far its largest consumers to-day, absorbing about half of the world's product.

Coffee is essentially a tropical plant and is limited to parallels of twenty-five degrees north and south latitude. The best is grown in Arabia, but not one pound of the Mocha coffee, so called because it is exported from that place, reaches the United States. The Mocha with which Americans are familiar is grown in the Western hemisphere, and does not resemble the Arabian bean.

The other coffees familiar in this country are the Java, from the East Indies; Maracaibo, from South America; Mexican, Central American, and Santos, from Brazil. The country last named furnishes two-thirds of the world's supply.—*The Search Light*.

WORLD'S LONGEST TUNNEL.—The Simplon is the longest tunnel in the world, and has been finished in the face of tremendous difficulties, most of which were entirely unexpected, and many of which presented new problems for engineers. It extends from Brieg in Switzerland to Iselle in Italy, the total length being a little over twelve and one-fourth miles—21,576 yards in fact. In comparison with other great tunnels, the following table will be interesting:—

The Simplon	12¼ miles
St. Gotthard	9¾ "

Mont Ceniz	7½ miles
Arlberg	6¾ "
Hoosac (U. S.)	4¾ "
Severn	4 1-3 "

THE PORT OF MANAOS—The port of Manaos presents to the observer two entirely different aspects according to the time of the year in which it is visited. Either the waters of the Rio Negro are seen pressing the rough wall along the river's side, as though it were endeavoring to reach the same level as the streets, thus giving the false impression of an exceptionally easy and cheap service of loading and unloading, for vessels may come directly up to the small warehouses along the shore, and the anchorage may be said to be within the city—and this is the rainy season, December to May—or, if visited during the dry season, there will be seen a space from 100 to 130 meters in width between the level of the river and the base of the wall which runs along the river front, the difference in level between these two points being 15 meters.

This phenomenon which occurs in the Amazon River and is reflected in its principal affluents, causing ordinarily six months of high water and six months of low water, is not common, and is almost unknown except in Brazil.

Such an anomaly made impossible the installation of works ordinarily erected for the mooring, loading, and unloading of vessels directly at the wharf, and it therefore became necessary to study a system which would be feasible and at the same time economical. The only solution presented was the construction of anchored pontoons forming perfect floating docks, and placed as near as possible to the shore, but at a point where there should always be plenty of water, even in the season of low water, for the mooring of vessels of the largest draft. The first pontoon having a length of 200 meters and a width of 20 meters has already been built on water-tight cylinders, having a diameter of 2 meters and a length of 5 meters. Four of these cylinders placed side by side form the width of the dock, and 30 of these cylinders, placed at intervals of 30 centimeters, form the length of the dock. On these cylinders are placed, running lengthwise, five rows of iron beams in rectangular-section, and on these are seated, transversely, double T-shaped beams which receive the floor of the dock. A system of aerial wires is used for the transportation of merchandise from the dock to the warehouses.

The wires or cables are suspended from three steel towers located on the pontoon and three others also of steel on large pillars of masonry on the land slide, in the center of the wood platform. The cables are firmly

fastened to the pontoon towers, and on the land side to the large counter weights which move in grooves placed in the rear part of the platform towers. In this way the cables, whether empty or carrying freight, sustain the same strain. Directly under the pontoon towers, and below the cylinders forming the structure of the pontoon, are sunk six cylinders. The regulating levers and commutator are installed in a small cabin halfway up the side of each of the pontoon towers. The towers on the land side are 15 meters high and those on the pontoon 21 meters, and the span between these is 153 meters. This pontoon is fastened in front to the platform and is also secured by ten anchors placed parallel to the platform, which prevent any movement. The chains of the anchors are tightened or loosened, according as the waters rise or fall.—*Monthly Bulletin Bureau of American Republics.*

VANILLA.—The vanilla seen in the beautiful forests of San Salvador, Costa Rica and Nicaragua belongs to the species known in commerce as “vainillón”—that is to say, the ordinary vanilla. Its pods, which measure from 14 to 19 centimeters in length by 14 to 20 millimeters in width, are almost black, soft, viscous, have a strong odor, but not as pleasant as that of the other species, and consequently are in less demand.

In commerce the genuine vanilla bean is usually sold, this being the the only kind employed in the manufacture of perfumes and other industries; it being known by its length, which varies from 16 to 20 centimeters, its width being from 7 to 9 millimeters, wrinkled up lengthwise, bent at the base, of a dark-brown color, soft, viscous, strong odor, and quite aromatic, covered at times with crystals of benzoic acid. A thinner vanilla bean is also sold, drier and of a lighter color, though less aromatic than the former; finally, the third class is our vanilla—that is to say, the “vainillón,” or ordinary vanilla, which is the kind commonly found here and for which there is not so much demand on account of its being less aromatic.

The first of this kind also is found here, although it is not so abundant, and even the wild vanilla is not properly prepared here for export. The plant is a climbing orchid, sarmentose, which fastens itself by means of special roots, called “claws,” to the trunks of the trees in the shady forests so abundant in several regions of Nicaragua. It is frequently found in the Province of Matagalpa, in the forests adjacent to rivers and streams.

The stems of the vanilla plant are of a cylindrical shape, green, knotty, of the thickness of a finger, and from every knot there branch off roots or claws which are firmly implanted in the bark of live and generally very high trees. These roots serve to support the vine, which sometimes extends along the ground to a distance equal to the height of the tree which it en-

circles, and also serve to nourish the vine by absorbing the humidity of the bark. The leaves have no peduncle, but shoot from the stem, alternate, far apart, elongated, shaped like a wide lance, thick, lustrous, provided with longitudinal grooves. The flowers are on the top of the stems in axial bunches, of a light yellow and are aromatic. The fruit is a fleshy capsule, green when young, and of a dark brown when mature; it is long, cylindrical, very aromatic, and therefore much sought after by birds; it contains a great number of small, black, oval, lustrous seeds, covered by a black, thick and balsamic pulp.

Heretofore Mexico has been the only country that has exploited on a large scale this precious product, supplying the European markets, where vanilla is sold at a high price. Should the Salvador species be cultivated, as is done at Papantla and Misantla, Mexico, the plant would develop to better advantage and produce a fruit more valuable than that which is at present obtained from the chance harvest secured in the forest before the fruit is matured, the fruit being poorly prepared, and almost without aroma.

The planting of this vine is very simple. Plots of black, smoky, loose, and damp soil are selected, where there are trees having few branches and at some distance from each other. The ground should be cleared, leaving only trees, at the base of which the vines should be planted and fastened to the trunks until the roots adhere to the bark, this being obtained by means of the humidity produced by the rains, the rainy season being the time for planting the vines.

Vanilla can be cultivated together with other crops. Vines prosper and yield abundant fruits when planted at the foot of cocoanut and other fruit trees. All that is needed is sufficient light, air, humidity, and that the sun penetrate through the branches down to the plants, and for this reason it is advisable to select trees which have fine leaves.

It is almost impossible to produce the vanilla plant from the seed. Generally, for planting, pieces of the vine from sixty to eighty centimeters in length are cut, and these pieces are planted in holes of from eight to ten centimeters deep, then the hollows are covered with earth and are lightly fastened with banana filaments or tree moss to the trunk until the stems develop roots in the knots, which are the claws by which the vine is kept attached to the trunk.

In order that the vines may obtain a firm hold, the planting is done in May or June, after the rainy season has set in. Four to six months thereafter the soil is freed from weeds, the vines that have not been properly entwined are straightened, and the rotten or dry ones are replaced.

At the end of three years the vine is greatly developed and creeps up

through the branches until covering the same, and then it commences to bear fruit. The crops are good until the ninth year, when the plant begins to degenerate, and the yield is scant, and then it should be replaced by new vines planted on the opposite side of the old ones, or the latter might be torn out by the roots if there are not sufficient trees to plant in some other place. As a general rule, it is in the dry season, near the months of December and January, when the crop is ready for harvest. By that time the pods are entirely ripe and of a smoky yellow color, emitting a pleasant aroma, which attracts many birds, for which reason many planters cut it while green, which injures the aroma of the fruit.

The male and female flowers being in separate bunches, it becomes necessary to fertilize them artificially by shaking the pollen of the male flowers over the female flowers. Without this precaution the plant yields not more than thirty to fifty pods, whereas by the artificial method each vine produces from 250 to 300 pods.

As the vanilla vine often grows along the higher branches of the trees to which it adheres, it is necessary that the pod gatherers use wire ladders with iron hooks, which they fasten to the branches or trunks. To transfer the pollen a stick with a ball of cotton at one end is sufficient, it being used to touch the female organs of the flowers, an operation which should be done each morning, inasmuch as the flowers are closed by the sun about nightfall. Children and women may be employed in this operation to gather the barren flowers that generally fall from the plants two days after coming into bloom.

The capsules should be gathered as soon as they commence to become yellow, and before they are in full bloom, for besides being eagerly sought by birds when they are in such condition, they lose almost all their aroma. In cutting the fruit the necessary care should be taken not to injure the stem from which the bunch hangs, because it becomes rotten easily at the time of preparing it.—*Monthly Bulletin Bureau of American Republics*.

THE WORLD'S PETROLEUM SUPPLY.—The United States supplied more than one-half of the petroleum produced in the world in 1904. A statement of the world's production of petroleum, prepared by the British Board of Trade, which has just reached the Bureau of Statistics of the Department of Commerce and Labor of the United States, puts the petroleum production of the world in 1904 at 9,303,000,000 gallons, of which 4,916,000,000 gallons were produced in the United States, 3,650,000,000 gallons in Russia, 202,500,000 gallons in Austria, 206,500,000 gallons in Java and Sumatra, 135,000,000 gallons in Roumania, 105,500,000 in British In-

dia (principally Burma) 49,000,000 gallons in Japan, 20,000,000 gallons in Canada, and 18,500,000 in Germany.

These figures give the grand total of 9,303,000,000 gallons of petroleum production in 1904, a total which far exceeds that of any earlier year. In 1903, which made the highest record of any year prior to 1904, the total was but 8,504,000,000; in 1902 it was 7,588,000,000. This increase in 1903 and 1904 occurs chiefly in the United States. The figures of production in the United States show an increase of about 697,000,000 gallons in 1904 over the figures of 1903, while those of Russia, our chief competitor in oil production, show an increase of but 103,000,000 gallons over 1903, and the increase in the United States in 1903 is also much larger than that of Russia. In the four years, 1898, 1899, 1900, and 1901, Russian production of crude petroleum exceeded that of the United States, but in all other years for which the record is shown by the publication in question, extending from 1883 to 1904, the production of the United States exceeds that of Russia, and by far exceeds that of any other country. Indeed, it may be said that the United States and Russia produce practically nine-tenths of the petroleum of the world, the total production in 1904, as above shown, being 9,303,000,000 gallons of which 8,556,000,000 were produced in the United States and Russia combined.

Exportation of illuminating oil, or kerosene as it is familiarly called, is also much greater from the United States than from Russia, especially as American crude oil gives a much larger per cent. of illuminating oil than does that of Russia. The total quantity of refined illuminating oil exported from Russia in 1904 was 455,000,000 gallons, and from the United States 761,000,000 gallons. Russian exports go largely to southwestern Europe, northern Africa, and southern and eastern Asia, while western Europe, eastern Asia, Oceanica and North and South America are the most important markets of the United States. Of the 876,000,000 gallons of refined oil for all classes (including naphthas and lubricating oil) exported from the United States in the calendar year 1904, 201,000,000 gallons went to the United Kingdom, 117,000,000 to Germany, 112,000,000 to Netherlands, 41,000,000 to Belgium, 24,000,000 to France, 74,000,000 to other countries of Europe. In eastern Asia 70,000,000 gallons went to China, 39,000,000 to Japan, and 24,000,000 to Hong Kong, while 25,000,000 gallons went also to southern Asia under the general title of British East Indies, and 26,000,000 gallons to British Australasia. In America the distribution was to Brazil 20,000,000 gallons, Argentine Republic 16,000,000, British North America 19,000,000, Chile 6,000,000, Central America 2,000,000, Cuba 2,000,000, and Mexico 1,000,000.

Petroleum has formed of late years an important factor in the exportation of the United States. Prior to 1905 it was the largest single item in the statement of exports of manufactures, but in that year copper for the first time exceeded petroleum in the value of exports. The total value of all classes of iron and steel manufactures exported, of course, exceeds by far the total of petroleum, but no single item in the group entitled iron and steel manufactures is as large as the item of illuminating oil under the general head of refined mineral oil exported. The total value of iron and steel manufactures of all classes exported in the decade ending with 1905 was \$943,886,511, of refined mineral oil \$622,313,762, and copper and manufactures thereof \$444,878,552, while the next largest item is leather, \$272,534,562, and cotton manufactures \$259,136,044.—*Monthly Bulletin Bureau of American Republics.*

THE NEBULAR AND PLANETESIMAL HYPOTHESIS¹.—The planetesimal hypothesis of Professor T. C. Chamberlin and others assumes an origin of the earth directly opposite to that according to the nebular hypothesis propounded by Kant and Laplace. The latter hypothesis holds the existence of a mass of incandescent vapor which by condensation and rotation was differentiated into successive rings; the latter being gathered up into planets *while still retaining intense heat*. The new hypothesis assumes that the disseminated planet-forming matter had *lost its heat* while yet existing in the loose form, as rings or zones of the parent nebula, and that the globular planets were *formed by the slow accretion or infalling of cold, discrete bodies or particles* (planetesimals). The old hypothesis assumes an original hot globe, with shrinking on account of cooling; the new regards the globe as originally and always cold at the surface, and the interior heat as the product of condensation through gravity. While the old hypothesis involves the existence of a primal heated atmosphere and ocean consisting of the more volatile substances of the earth's mass, the new derives the atmosphere and ocean from the earth's interior by a slow process of expulsion due to pressure and heat. A complete outline of the Planetesimal hypothesis may be found in the Chamberlin and Salisbury's *Geology* just published.

¹Prepared by Department of Education, Albany, N. Y., and published at the request of teachers using the 1905 Syllabus in Physical Geography and Agriculture.

THE KNOWLEDGE OF GEOGRAPHY

"A man may know a million facts but unless they are built into a definite system they do not constitute science." Information about the ways of people in different parts of the world only becomes geographic knowledge when those facts are organized causally.

NEWS ITEMS

The Geographical Association of Britain, formed a number of years ago to promote geographical education in the United Kingdom, reports greatly increased interest in its work during 1905. The total membership is now 503, ninety-eight new members having been added during the year. Branches have been established in Bedfordshire, Bournemouth and South Africa. Exhibits have been held in various places, and the *Geographical Teacher*, the official publication, has been regularly published under the effective editorship of Dr. Herbertson.

Professor Albrecht Penck, of Vienna, has accepted the professorship of geography in the University of Berlin, made vacant by the recent death of Professor von Richthofen.

An exhibit of geographical equipment available in teaching will be held in the Educational Museum of Teachers College, New York City, for three weeks beginning March 26. A cordial invitation to attend is given to all interested.

Professor Albert P. Brigham, of Colgate University, will lecture at the University of Wisconsin, Madison, Wisconsin, during the summer session of 1906, and Miss Ellen C. Semple, of Louisville, Ky., will lecture on Anthropogeography at the University of Chicago during the summer term.

The Bulletin of the Geographical Society of Philadelphia will hereafter appear at quarterly intervals, instead of irregularly as heretofore. The first number for January 1906 is at hand and is attractive in makeup and strong in its contents.

A course of lectures and practical work in geography will be given at the School of Geography of the University of Oxford from August 7 to 25, 1906. Excursions will be a strong feature of the work and some attention will be given to field demonstration of map drawing and surveying.

The School of Geography at the University of Oxford, established in 1899, has conferred nine diplomas upon candidates who have completed (three with distinction) the required course. The diploma is awarded after one full year's work to students who pass satisfactorily a theoretical and practical examination in Regional Geography and two of the following subjects: Climatology and Oceanography, Geomorphology, Ancient Historical Geography, Modern Historical Geography, the History of Geography, Surveying.

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AN INDUCTIVE STUDY OF THE CONTENT OF GEOGRAPHY.*

BY W. M. DAVIS
Cambridge, Mass.

(Presidential Address at the Second Meeting of the Association of American
Geographers, December, 1905.)

The Need of Comparing Opinions.—One of the objects to which this Association may well direct its attention is the nature of the whole subject of Geography, under whose broad shelter our individual studies are carried on. If we work only in view of our chosen field within the whole area of geography, we lose something of breadth, although we may gain much in depth. Our work will become more serviceable to others if it is presented in such a manner that its relations to the whole subject are made clear. Not only so; we may often benefit ourselves by systematically setting forth the place of our individual studies in geography as a whole, for we may be thereby led to discover that the systematic sequence of parts is interrupted here and there by gaps, which can be filled by well-directed effort. * * * * *

But it is manifest that, if we should attempt to make exposition of our ideas concerning the relation of our own studies to the whole subject, we must have previously gained a tolerably definite idea of the nature of the whole. Very likely we each have some such conception. If so, it would be profitable to institute a collection and a comparison of opinions; though it can hardly be doubted that they would show much diversity.

Examples of Geographical Statements.—As a contribution towards such a collection of opinions, I propose to consider the nature or content of geography in this address; but instead of presenting an abstract definition of the subject, the problem will be regarded from the other side. There will first be presented a number of sample statements that are presumed to

*Reprinted from *Bulletin of the American Geographical Society*, February, 1906.

be geographical because they are taken from geographical works; these statements will then be analyzed in order to discover their essential nature; finally, an attempt will be made to discover the nature of the whole subject of geography on the basis of the statements thus analyzed—that is, to discover the content of geography on the basis of an inductive study. The statements to be presented are taken from a variety of sources—text-books, treatises, and journals; they are often condensed from the original.

Here, for example, is a first set of items or statements: There are three native states in the Himalaya which are independent of British rule.—The rivers of southern Gascony flow in radiating courses.—There are more than 300 asteroids.—The average man has about eighty-seven cubic inches of brain.—The mean depth of the ocean is about two miles.—A new map of France on a scale of 1:50,000 is in course of publication.—Protozoa are the simplest forms of animals, consisting of a single cell.—The magnetic poles do not coincide with the poles of rotation.—Celtic is spoken in Wales, the Highlands of Scotland, and western Ireland.—Cotton is produced in the southern United States.—The fall of rivers is usually greatest in their upper courses.—The Grand Duchy of Prussia became a kingdom in 1701.—Cryptogams are flowerless plants.—The Hindu-kush, the highest mountains of Persia, trend to the northeast.—Australia has many marsupials, of which the kangaroo is the largest.—Amundsen has successfully made the Northwest Passage.

If all these statements are truly of geographical quality, it follows that all similar statements would be of geographical quality also. We should then have, in a complete geography, accounts of all states, in the Himalaya or elsewhere, dependent or independent of British or of other rule; descriptions of the course of rivers in all parts of the world; additional facts about other bodies in the heavens besides the asteroids; accounts of man's other organs than his brain; details as well as averages of ocean depths; descriptions of multicellular as well as of unicellular animals, and of flowering as well as of flowerless plants; reports on old as well as on new maps of France and of all other countries, whatever their scale; other items concerning terrestrial magnetism as well as the position of the magnetic poles; reports of all sorts of voyages; accounts of the changes of all duchies to kingdoms or of kingdoms to duchies, and of other political changes as well; mention of the animals of other lands than Australia, and the products of other countries than our southern States; announcements of voyages in all parts of the world in all centuries.

The Complexity of Geography.—The first impression about so varied a collection of statements would be that the subject under which they are

all properly included must be a sort of *omnium gatherum*, without any well-defined unity of substance. Such, indeed, geography has been thought to be by some critics. A closer examination of our materials must be made to see if we really have to do with a heterogeneous collection of incoherent facts, without continuity of thought or unity of discipline. It may be that some of the items above cited do not justly belong under geography, and that an enchainment not apparent at first may be found to bring the remaining items and their proper fellows into some systematic association.

On reviewing the statements given above it appears that some are concerned with matters remote from the earth and commonly associated with astronomy; that some are concerned with matters of a personal or technical nature; that a third group of statements contains accounts of inorganic features of the earth; and a fourth group, of organic inhabitants of the earth. Let us examine these several classes to see in how far they may be justly considered geographical.

Excepting as an astronomical statement is found to be related to terrestrial matters in such a way as to throw light on them, it should not be considered directly or indirectly geographical, in spite of the mention of such a matter in a geographical text-book; for by common consent geography has to do primarily with the earth. Hence the mere statement of the number of asteroids should be excluded from our consideration. It may, however, be advisable to retain in elementary text-books certain statements concerning planets in so far as they serve to emphasize the globular form of the earth by showing that there are other bodies like it; and such mention of the sun and moon as is needed for the understanding of insolation in relation to climate and of gravitation in relation to tides; and such account of the stars as shall serve in the proof of the rotation of the earth and in the determination of the attitude of its axis. Nevertheless all of these items seem to be only indirectly associated with our subject; they do not aid us to discover the real nature of geography.

Technical and personal items may naturally be associated with geography, if the things and events with which they are concerned are of geographical quality, as maps and explorations certainly are. The announcement of the publication of a new map or of the completion of a remarkable voyage is therefore a piece of appropriate geographical news. Accounts of old maps, of old voyages, and of old ideas are very illuminating in showing how the geography of to-day has been developed; but they belong more with history than with geography when presented in order of time.

Non-Geographical Statements.—Many of the statements under the two remaining classes, which concern inorganic and organic matters on the

earth, are properly geographical, if we judge by the repeated occurrence of such statements in many geographical works. Yet we cannot believe that all statements about inorganic and organic matters on the earth belong under geography. It is easy to instance a number of such statements from geographical sources which can hardly be regarded as having any clear association with geography. Consider, for example, the following set of items, all taken from geographical text-books:

The gastrula stage occurs just before maturity in the sponge.—All substances transmit electrical energy.—Crystallization is explained by supposing that the cohesive force of molecules is not exerted equally on all sides.—After 1810 several independent republics were formed in South America.—The rosaceæ have regular flowers.

However interesting and useful these items of information may be, they can hardly be regarded as geographical, even under the very broadest interpretation of our subject. They have probably been added to the text-books from which they are quoted in the belief that they are worth knowing, and that the pupils in our schools will have little chance of learning them if they are not brought in under the popular subject of geography. I question the advisability of such a method of promoting popular education; but that is another story. Our problem is to distinguish these and many similar statements from a large variety of other statements concerning the inorganic and organic terrestrial matters, so as to know which ones are properly of geographical quality and which ones are not.

Statements involving Relations.—The best solution that I have been able to find for this problem comes from a consideration of such statements as are included in the following third set of extracts which like the other two, have been taken from geographical sources:

The people of the Dalmatian coast are largely engaged as fishermen on the Adriatic; here the Austrian navy obtains its best seamen.—A number of gulfs and mountain ranges naturally divide the people of Europe into groups or nations.—Some parts of Bengal are so favored with rivers that almost every cottage has a navigable stream at its door, and the Bengalese farmer keeps his boat just as the English farmer keeps his gig.—Northern Uganda is drier, rain often fails, grass is short, and dry-country animals, such as zebras and ostriches, abound.—The level land near Lake Titicaca is of small extent, and is occupied by alkaline marshes subject to overflow; for this reason the Indians cultivate the slopes in preference, converting them into narrow terraced garden beds.—The periodic or monsoon winds that blow alternately in one direction and the other along certain coasts, as between India and East Africa, have long been favorable to navigation and

trade.—In northwest France the farmhouses on the chalk uplands are gathered into compact villages around one or more deep wells, because the ground water there is deep below the surface and difficult to obtain; but in the valleys the houses are scattered, because each family can easily procure its own water supply with little trouble.

Geography, a Study of Relations.—These statements differ from some of those of the two earlier groups of citations, in that they each contain at least two kinds of elements, one of which stands in a more or less distinctly causal relation to the other. The statements vary, in that some of the relations suggested are relatively simple while others are more complex; and in that some statements are rather empirical while others are more fully explanatory; but they are all alike, in that they involve a relation of cause and effect, usually between some element of inorganic control and some element of organic response. As such, these statements are examples of the most generally treated material that I can find; and hence I am disposed to say that any statement is of geographical quality if it contains a reasonable relation between some inorganic element of the earth on which we live, acting as a control, and some fact concerning the existence or growth or behavior or distribution of the earth's organic inhabitants, serving as a response; more briefly, some relation between an element of inorganic control and of organic response. The geographical quality of such a relation is all the more marked if the statement is presented in an explanatory form. There is, indeed, in this idea of a causal or explanatory relationship the most definite, if not the only, unifying principle that I can find in geography. All the more reason, then, that the principle should be recognized and acted upon by those who have the fuller development of geographical science at heart.

Geography as the Study of Location or of Distribution.—There still exists in some quarters a tendency to limit geography by definition to the study of location, leaving the study of all things that are located to other subjects. There is so little support for this narrow view of the subject to be found in modern geographical books that it need not be further considered. Another and more widely-accepted definition treats geography as the science of distribution. This is particularly a British view of the subject, and at least one British geographer urges that the distributed things should not be regarded as belonging to geography at all; but his writings are broader than his definition. While location and distribution must always be important elements of geography, all geographical books give much attention to the nature of the things that are distributed, and all recent books give much weight to the relations in which the distributed things

occur: hence relationship seems to me the primary principle of the two, and distribution takes a secondary rank. The thing must be known before its distribution can be serviceably studied. The division of the peoples of Europe into groups or nations in consequence of the division of Europe by gulfs and mountain ranges is a geographical relation, in which the unlikeness of the things distributed takes precedence of their distribution.

Indeed, if geography is only the science of distribution—that is, the regional aspect of other subjects—it would be hardly worth while to maintain the study of geography apart from that of the subjects whose regional aspect it considers. Moreover, if geography is defined simply as the science of distribution, then the distribution of anything at all is a fit subject for geographical study. Under such a definition the distribution of hypersthene andesite or of books of poetry would be part of our responsibility; but there is nowhere any indication that geographers feel responsible for the distribution of such things. Again, if distribution is given first rank, the regional or spacial occurrence of all sorts of things is thereby given so great an importance that an insufficient place would be left for the systematic consideration of geographical things; yet most books first present things of a kind together—that is, they present the subject systematically—before they take up the distributional or regional treatment of different kinds of things.

As a matter of fact, nearly every example that is presented in this essay as an example of a geographical relation might, if desired, be presented as an example of distribution; and nearly all statements of distribution may be turned around so that they shall enter into or constitute relations; hence the total content of geography would be much the same under either principle. The relations that could not be presented under the lead of distribution are those which are the same everywhere; but it seems to me rather arbitrary to include relations that vary from place to place, and to exclude relations that are world-wide in their uniform occurrence. For example, the composition of the atmosphere or of the ocean, always accepted as an appropriate matter for mention in elementary texts, deserves no place in geography, treated as the science of distribution, until the minute variations of composition from place to place are considered.

In any case, location and distribution are fundamental elements of geography, and maps of the lands and charts of the oceans are essential in its every chapter. In view of the importance of these elements, some are disposed to attach an undue value to surveying as a part of geography. But surveying properly belongs in geography about where writing belongs in literature; and if it is given higher rank the student may, by misfortune,

turn his chief attention to the art of mapping instead of to a study of the things that are mapped.

Physiography and Ontography.—If the principle of explanatory relationship be adopted as a general guide to the content of geography, it follows that neither the inorganic nor the organic elements which enter into geographical relations are by themselves of a completely geographical quality; they gain that quality only when two or more of them are coupled in a relation of cause and effect, at least one element in the chain of causation being inorganic and one organic. When they are considered separately, but as if in preparation for an understanding of the causal relations in which they will be later presented in the study of geography proper, they may be considered sub-geographic; and then the inorganic elements may be called physico-geographic; or physiographic; and the organic elements may be called ontographic. Common usage recognizes the first of these divisions, but not the second, as we shall see later. It is well to emphasize the clause, “as if in preparation for an understanding of the causal relations in which they will later be presented in the study of geography proper;” for many items which, under this proviso, are of physiographic or of ontographic quality, may under another proviso belong in other departments of knowledge.

Physiographic Matters.—This may be made plainer by citing particular cases in which a number of different topics, familiar from their occurrence in books on geography, will be seen to fall under other subjects when they enter into non-geographical relations. For example, the size and rotation of the earth and the general movements of the tides are undoubtedly physiographic elements, yet both may be treated appropriately under astronomy when they are considered in their relations to other planets. Sea-water, when regarded as a liquid compound which holds various salts in solution, may be studied properly by the chemist with regard to its composition; nevertheless sea-water, as the medium in which organic forms live, is an indispensable subject for physiographic inquiry. The horizontal strata of plateaus are a fit topic for geological investigation, as regards their origin and history; but they are no less a subject for physiographic investigation as affecting present form. It, therefore, seems impossible to determine, merely by a consideration of the thing studied, whether it belongs to physiography or not.

A given object may belong under several different sciences, and may be treated in text-books on different subjects; it is the relation into which the object enters that determines its place.

There are, however, certain inorganic topics, commonly found in geo-

graphical books, which seldom, if ever, enter into relations with organic topics, and which would, therefore, under the strict application of the principle of relationships, be ruled out of physiography, and thus out of geography also. Such are cirrus clouds and haloes, the crevasses and blue veins of glaciers, and the polar flattening of the earth. Nevertheless, most or all of these topics will probably hold their places in books on physiography, because they serve to complete the picture of the whole earth as the home of life. In any case, little is gained by a very strict or over-logical application of a useful principle of classification in a problem such as we are considering.

Ontographic Matters.—The determination of the science under which a thing belongs by means of the relations into which the thing enters is an even more important guide in ontography than in physiography. For example, one may read in a certain text-book of geography that all forms of life consume food. In so far as the assimilation of food and the organs by which it is accomplished are concerned, the consumption of food belongs under physiology; but the consumption of food is an ontographic matter in so far as it brings an organism into contact with the rest of the world and thus causes it to enter into geographical relations.* Commercial geography is largely concerned with relations that grow out of this element of ontography. Water is essential in organic processes of many kinds. This is, again, a physiological matter, if it is examined with reference to the processes of circulation; but it is ontographic when it is found to lead to a relation with the sources of water supply; villages gathered around deep wells on the chalk uplands of northwestern France are examples of the geographic relation thus brought about.

Plants and animals tend to diffuse themselves or to be diffused over the earth. This is a fundamental fact, usually associated with the study of biology; but the limits of diffusion and in many cases the means of diffusion are determined by physiographic controls, hence the tendency to diffusion is an ontographic matter.

The need experienced by all forms of life to secure food, already instanced, leads to many other relations than those of commercial geography. The need of food is satisfied without going in search of it if the food is contained in a moving medium that surrounds the organism; hence those organ-

*As thus defined, ontography is more narrowly limited than in my paper on "A Scheme of Geography" in the *Geographical Journal* for October, 1903, where it was made practically to include the relations or responses which responding organisms enter into with their inorganic controls. Defined in that way, ontography is too nearly identical with biogeography, or indeed, with geography. As here limited, ontography is not the study of the organic response, which is practically equivalent with the geographical relation itself; it is simply the study of the organic act or deed or motive which results in a response or relation when a physiographic control is encountered.

isms that live chiefly upon food contained in one or the other of the two great mobile envelopes of the earth, the atmosphere or the hydrosphere, are often rooted or fixed: the air or water currents carry the needed food to the waiting plant or animal—and this is surely too important a geographical relation to be omitted from a broad consideration of our subject. Other organisms take advantage of the currents of air or water to be passively carried about by them, taking their food when they happen to come upon it. If they are land-dwellers, they are so small that they can easily be wafted about by the winds; if they are dwellers in water, they may gain greater size by assuming about the same specific gravity as that denser medium, so as to float easily in its perpetual currents*. Still a third class of organisms move of their own volition; and in connection with these there are all manner of geographical relations. Some of them involve the development of wings, whereby motion can be effected in the comparatively unsustaining air, as in the case of many insects and birds, of a few mammals, and formerly of some reptiles; some involve the development of fins to produce motion in the sustaining water. These examples are as good illustrations of organic responses to inorganic controls as are the canoes and the steamships of uncivilized and of civilized man.

It follows from the preceding paragraph that the more closely our standard geographical material is examined, the more clearly it appears that its ontographic as well as its physiographic elements may fall into other sciences when they are treated in other relations; and that they become most distinctly geographic when they enter into the causal relations of the kind set forth above. The rise and fall of the tides is a physiographic matter when it is seen to determine the distribution of certain forms of life, such as barnacles, or to influence the availability of harbors for the entrance of shipping; the occurrence of coal is a physiographic matter when it is found to influence the industry of a district and the commerce between nations; the small size of spores, pollen, and germs is an ontographic matter when it is seen to be related to their transportation by the thin air; the sensitiveness of organisms to temperature changes is an ontographic matter when it is shown to affect the distribution of plants and animals over the earth. Yet all these matters may be treated with entire justice under other sciences than geography. It is, therefore, to my reading, of capital importance in determining whether

*If the substance of this relation were treated under the principle of distribution, it could be presented as follows: Organic forms that have no means of locomotion of their own, but depend on a moving medium for their transportation, are of unlike size, according as they occur on the lands or in the ocean. If they inhabit the lands they are of minute, even of microscopic size, so that they may be carried about by the winds of the unsustaining air; they may be of larger size if they inhabit the ocean, for there they so closely imitate the specific gravity of the water that they float about with its perpetual currents.

a statement is of geographical or sub-geographical nature to know how far it constitutes or enters into causal relations of the kinds that have been here considered.

Is Ontography a Part of Geography?—It is perfectly true that many of the illustrations just given are not commonly regarded as belonging under geography; but it seems to me that their exclusion is illogical and arbitrary. They are practically all to be found in certain standard geographical works, and many more might be taken from such books as Ratzel's *Anthropogeographie* and Beddard's *Zoogeography*. The general principle by which one should be guided in determining the relevancy of such matters is as follows: If a certain relation between an inorganic control and a responding organism is a geographic relation, then all similar relations are also geographic. For example, a well-known text-book makes the statement that water-plants are supported by the relatively dense medium in which they grow, and hence do not need strong woody stalks such as many land-plants have. This is an excellent example of a geographical fact: it involves a relation between an organic growth and an inorganic medium.* But the flight of birds, the small size of germs, the essential agreement between the specific gravity of fish and of water, the universal habit of breathing oxygen, all involve similar relations. The first example seems to be undeniably geographic; the others are no less so. To exclude the latter from geography while including the former would be to set very arbitrary limits to our subject.

It may, perhaps, be objected that flight and breathing are processes of too ancient origin to be considered as geographical; but inasmuch as they are maintained into the present time, by inheritance through persistent conditions of environment, they have the same right to a place under geography as is enjoyed by such examples as the prevalence of the fishing industry on the Dalmatian coast, or the custom of the French farmers on the chalk uplands of living in compact villages; for these habits, also, are not independently originated by each man who follows them, but are continued by inheritance through persistent conditions of environment.

There are certain matters, frequently encountered in text-books of physical geography, which belong better, as it seems to me, under ontographic relations. Such are the distribution of plants and animals, and the races of man. The association of such topics with physical geography is probably the result of conceiving all the rest of the subject as contained

*If stated in terms of distribution, this might be phrased as follows: Plants with stems and branches strong enough to support their own weight grow on the land, where the air is too light to buoy them up; plants with weak stems grow mostly in the sea, where they are held up by the heavy water.

under political geography. The contrast of physical with political conditions may serve well enough in elementary books, where the distribution and behavior of man are the chief subjects in political geography, and where plants and animals are therefore thrown in with physical geography; but in the more advanced and general treatment of the subject such an arrangement is not satisfactory. It does, however, seem legitimate to introduce as often as desired ontographic responses in a physiographic text, in order to show at once the kind of response that certain controls call forth, and thus to impress the fact that the physiographic items are really related to ontographic items: a similar introduction of physiographic items is appropriate in chapters on ontography. This practice is followed by certain writers.

There are three definite positions and many indefinite positions that might be taken with respect to the attention that should be given by geographers to organic considerations. The narrowest position limits geography almost entirely to the inorganic features of the earth—that is, to physical geography or physiography. This is the view of geography held by some historians, who take unto themselves practically all the human element that is so commonly encountered in political geography. An intermediate position would include physiography and the more manifest relations into which it enters with various forms of life, and particularly with man, but would not accept responsibility as to the less manifest responses of various living things. This seems to be the position taken by many geographers, more or less consciously. The third position would treat ontography as thoroughly as physiography, and would search for all the geographic relations of physiographic controls and ontographic responses. This is certainly the broadest of the three positions, being, as many would feel, too broad, and involving too much overlapping upon other subjects. For my own part, there seems to be so manifest a necessity of gaining a responsible knowledge of ontography, at least of elementary ontography, before geography proper can be successfully treated, that ontography should come to be regarded as a part of it. The analytical and inductive methods of this paper, therefore, lead me to adopt the third position; and I believe that this position is essentially consistent with the opinion of writers who, like Ratzel and Reclus, have cultivated the most advanced or matured stage of geographical science.

The Importance of Explanatory Relations. Although various facts which may make parts of relations between inorganic controls and organic responses, or which are met with in preparation for an understanding of such relations, thereby gain a more characteristic geographical flavor, a very brief review of geographical books will suffice to show that many such

ments there included do not explicitly possess this flavor. In the first place, in the older books the idea of relationship had no distinct recognition. That was the time of memorized names of capes, of empty boundaries, of unexplained lists of products. Almost anything about the earth or its inhabitants was then accepted if it reached a satisfactory degree of what is called "importance." In the newer books, the principle of explanatory relationship is very generally acted upon; there are, nevertheless, many relations stated so empirically that the pupil may fail to gain from them a full appreciation of the best essence of geography. Consider, for example, the following statement from a good text-book: Some form of Celtic is spoken in Wales, the Highlands of Scotland, and western Ireland. This is nothing more than an empirical statement of a fact of distribution. Many a student might memorize such an item without gaining any clear insight into its geographical meaning. The real point is that the early inhabitants of Great Britain being attacked by invaders from the continent on the east, survived only where pursuit was difficult, as in the rough ground of Wales, in the rough and distant ground of the Highlands, or in the distant and isolated ground of Ireland; and hence only there the early language is still preserved. The fact that Celtic, as Celtic, is spoken in certain parts of Great Britain belongs to philology as well as to any other subject; the fact that Celtic is the language that was once spoken generally through Great Britain might come under history as well as under any other subject; but the fact that Celtic is still spoken in rough, distant, or isolated parts of Great Britain, because of their roughness, distance, or isolation, is a local example of an important class of relations between controls and responses, and as such it belongs distinctly under rational geography.

The Expansion of Geography.—Geography has still much progress to make. There is not only much to be done in the way of exploration of little-known lands and seas, but many of the more civilized countries still merit closer study than they have yet received, if we may judge by the notable incompleteness of the best handbooks and treatises. One method of carrying the subject forward consists in outdoor observation; and this method cannot be too highly recommended to those who wish to contribute to the fuller development of our subject. When we realize that we have no modern and maturely-developed account of the geography of such a state as Virginia, or Ohio, or Colorado, or California, it becomes evident that abundant opportunity for exploration lies near at home. But there is a second method by which geography may be promoted—that is, by thinking about what we see, and thus expanding every example of a geographical relation that we find to its farthest legitimate extension. Take, for ex-

ample, the common case of a road which runs through a notch in a high ridge; such a detail of location is a response of the ontographic element, movement, to the physiographic control, gravity; hence all such responses to gravity should be searched out so that they may be systematically treated as to kind, and regionally treated as to distribution. Such matters are surely as properly of a geographical quality as are various responses to sunshine which are always found among the standard matters of our books. How many more responses to the universal and persistent force of gravity there may be, we do not yet know. Again, take such an example as that afforded by the habit of working by day in summer and resting by night in winter. These are responses to the controls of light and heat in contrast to darkness and cold, which result from the illumination and warmth of the rotating and revolving earth by an external sun. This suggests that all other responses to light and to darkness should be sought out and studied; for it leaves the limitations of our subject very vague if we make a beginning with such relations and do not carry them to an end; it makes the limitations very arbitrary if we make a beginning of such relations and stop with the first or the second or the third example, instead of pressing on to the very last.

It is an application of this same principle that makes it impossible to limit the organic side of geography to man; for the habits which man has developed in his search for food, clothing, shelter, and so on are in very many ways closely analogous to those developed by animals in a similar search. In the same way the sensitiveness of man and animals to climatic conditions by which limits of distribution are so largely determined is paralleled by the sensitiveness of plants to similar conditions. Life is a unit; if one form of life comes under the study of geography because it responds to physiographic controls, then all forms of life come under geography.

The expansion of geography through time is likewise inevitable, unless it is most arbitrarily limited to the "present day." Precisely the same principles have been embodied in the relations between physiographic and ontographic elements in the past as are embodied in them now. It is, therefore, most illogical to think of geography as a science that deals only with to-day. There has always been a geography, all through the geological ages; geology is the integration of all its momentary or geographical differentials. We may never know very much about the successive geographies of the past; but all the fragments that have thus far been learned assure us that it was of essentially the same order as the geography of the present. The recognition of this principle is of the greatest importance to geography and to geology as well.

The Subdivisions of Geography.—It is but natural that the different phases of human geography should have been more fully developed than the other branches of our science. Political geography, frequently over-running civics, economics and history, has long been familiar as an elementary subject; but with us it has seldom been carried into the higher reaches of education. Commercial geography is rapidly gaining an important place in our schools, and is meeting the danger of becoming almost as empirical as the old-time list of products of the several states. Biogeography has several parts. Anthropogeography, as expanded by Ratzel, seems destined to become an important subject in the universities, because of the greater insight that one gains through it into history. Zoogeography and phytogeography are, in my opinion, as a rule, too strictly limited to facts of distribution alone; these divisions of the subject should be expanded so as to include for animals and plants a consideration of what would correspond to the political and commercial geography of man. Paleogeography is occasionally treated, but it must always be a fragmentary subject, because it is based on fragmentary records; it will, however, be better treated by geologists in proportion as they have had geographical training.

The growth of explanatory treatment, which makes so characteristic a difference between the content of geography in books of a hundred years ago and of to-day, is chiefly due to the different amounts of general knowledge in stock then and now, and consequently to the different philosophies then and now prevailing. The subject has thus gained greatly in strength, in disciplinary value and in living interest. At the same time, geography has come to cultivate more and more—some would say, to trespass more and more—upon the fields that are also cultivated by other subjects. If the trade-winds are not simply described as to region of occurrence, direction of blowing, weather conditions therein prevailing, and so on, but are also explained as parts of an extensive convectional circulation between equator and poles, modified by the deflective effect of the earth's rotation, all this explanatory matter has a strong flavor of physics. If the occurrence of plants of a certain kind in a given region is not merely asserted, but is shown to be the result of climatic conditions to which the plant responds owing to its sensitiveness to temperature and moisture, this closely resembles certain chapters of botany, and the same may be said regarding the relation of animal distribution to zoology. If the boundary of a state, the location of a city, or the industry of a district is rationally explained instead of empirically stated, the explanation is of a kind likely to be found in books on history and economics. Shall we then, in view of this, relinquish explanatory treatment to other subjects and content ourselves with empirical state-

ments? Shall we adopt the limitation to the location of things, as above suggested, and thus avoid duplication with other subjects? No. Duplication is unavoidable; and, moreover, it is reciprocal. The historian, as well as the botanist and the zoologist, must borrow from the geographer all manner of facts regarding location, extent, distribution, climate, form, movements, products, populations, and so on; the geologist can hardly make a step into the realm of the past without having made preparatory study of the present. Overlapping and duplication are unavoidable. We must each of us try as far as possible to concentrate upon his own subject; but we must at the same time borrow and quote with the utmost freedom from any other subject that will give us aid in the consideration of our own.

Examples of Helpful Duplication.—One of the most interesting fields that I have run across in geographical research is that open common where geography and philology overlap. It has often been remarked that the Arabs of the desert have many terms for sand dunes, evidently because they are familiar with the many forms that sand dunes there assume; their language has developed in a peculiar direction as an ontographic response to their peculiar physiographic environment. In the same way, the people of the Alps have various terms by which to name mountain summits of different shapes; this is another ontographic response to a peculiar physiographic environment. But there are other less manifest examples of a somewhat different kind. We treasure as a fine geographic example the long preservation of ancient forms of speech in remarkable purity in Iceland, an out-of-the-way island; and, by way of contrast, we like to mention Malta, an island that is very much in the way, where the mingling of peoples has resulted in the mixture of Arabic and South-European tongues. We have already called attention to the diffusion of organic forms as a fundamental ontographic fact, and we know that variation is an ontographic consequence when diffusion leads to a physiographic environment that involves separation as a result either of distance or of isolation. As examples of this sort of geographic relation, we may point either to the several species of cassowaries on the islands of Australasia; or to the several races of man on the larger divisions of the lands, where barriers formed by the oceans are supplemented by a desert barrier in the Sahara and by a mountain barrier in the Himalaya; or to the several nationalities in Europe, where gulfs and barriers are so important. But why not continue this line of inquiry, and instance, as another example of variation following on diffusion and separation, the differentiation of the Romance languages from Roumania to Portugal, and thus bring in the interesting story of the division of the *Langue d'oc* and *Langue d'oui* by the central highlands of France?

Why not include the even more extraordinary story of the words *pecuniary* and *fee*, which have come to look so unlike on their arrival in our composite language, because of their different paths of travel from their common source? This is of just as good geographical quality as is the contrast between the whites and the blacks in our southern states; they began alike somewhere long ago, and have come to be different through long ages of separation before they are again found together; and separation is an important element of physiographic control.

Not only speech but figures of speech are affected by physiographic environment. There are two examples of far-separated maritime peoples who were so impressed by the manner in which a boat is guided by its rudder that they both came to use a word, which primarily meant a stick and secondarily a stern oar, in a later figurative sense, meaning the guidance or control of a whole people. One of these examples is found with the Scandinavians, where the same word is used in "the helmsman *steers* the boat" and in "the king *steers* the people": here the original and the figurative meanings of the word both survive to-day. The other example began with the people of the eastern Mediterranean, and is now spread through all the Romance languages, and into the Romance element of English. French still preserves the original sense of the word in *gouvernail*, for rudder; but we have lost that sense, unless perhaps in a passage in the Bible concerning the "governor" (helmsman or captain) of a ship, and only know the figurative sense: the word "govern" is therefore a long-lasting response to an early maritime environment. In both these cases it is as legitimate to instance an effect of environment on language as to instance its effect on industry.

THE "CAUSAL NOTION" IN SCHOOL GEOGRAPHY

The emphasis of the causal relations between geographic facts is the keynote to modern school geography teaching and is what distinguishes the so-called "New Geography" from the not wholly to be despised "Old Geography." The causal relations are the permanent phases of geography, for while statistics may change and the features of any one locality vary from year to year, the relations between the people and their environment will be an ever present problem to be worked out. The ability to see causal relations is worth much more to a pupil than information about facts which are not studied causally, for it will make him able to go to new regions and there to study the geography understandingly, and will give him a basis for making items of information contributions to knowledge of permanent value.

ABOUT NETS FOR MAP DRAWING

BY MARK S. W. JEFFERSON,
State Normal College, Ypsilanti, Mich.

SUCH work as Mr. Brown suggests in his admirable paper on map reading (J. G. IV, 273) is so valuable that more and more of it is going to be done and few will do it without wishing they could more readily reproduce maps on varied scales to suit the needs of such work. To-

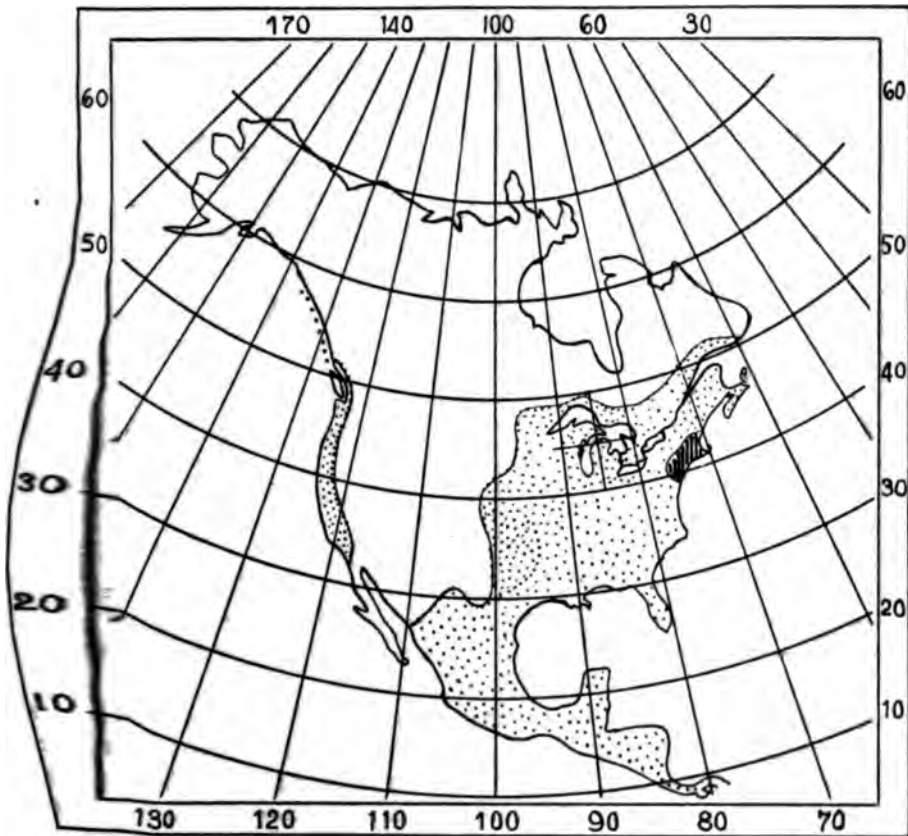


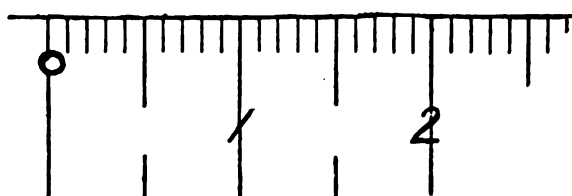
Fig. A.

day the climatic data are best taken from Bartholomew, the populations from Berghaus and various national censuses, the plants from Schimper and other data from numberless other sources. The maps in these books

how good a map the clumsiest pupil will make on a tolerable network and how quickly it can be done. To transfer data from one map to another of different size and projection becomes very simple with this help. But where shall we get the nets? We may make them for ourselves and even little children may make them, for they require the use of straight lines and circles only.

Here is the detail of drawing the net for a map of North America on the scale of the 6-inch globe.

1. Take a sheet of paper at least $5\frac{1}{2}$ inches each way.
2. Draw a faint line through the middle of the sheet parallel to two edges. Call this line the middle meridian.
3. Put two dots on this line, four inches apart and nearly equidistant from the top and bottom of the line.
4. Draw cross lines 4 inches long through the dots and bisected by them.
5. Connect the ends of the cross lines, making a square bisected by the middle meridian.
6. Outside this square draw another whose sides are separated from its sides by a space two-tenths of an inch wide. This gives the 4-inch square a double frame in which to number our network. We may begin by numbering our middle meridian 100° at top and bottom.



Now we need a rule divided into tenths of an inch and something with which to draw circles. The instrument dealers sell such a rule for ten cents and compasses may be had for all prices from five cents up, but we do not wish to incur expense and some of our circles will have a radius of over nine inches. We may satisfy both needs for barely two cents in this way. Carefully draw with India ink a rule divided into tenths of an inch, numbering only the whole inches. Any engraver will make a zinc etching from this for less than a dollar and from this your printer will make impressions on tough, flexible card. This will serve both as a rule and a compass, especially if you have the printer perforate each rule with a tiny hole placed, as I figure it, on the line of the inner ends of the shorter

divisions on the zero line. With the point of a well sharpened pencil inserted in this hole and a fine needle point thrust through the same point on any other division of the scale, a circle may be drawn of radius equal to the interval between them by fixing the needle in anything and keeping the card taut between the two while the pencil describes an arc. Circles may thus be drawn up to twelve inches radius. Our dealer can supply this rule if you do not wish to make it for yourself.

7. On the 100° meridian, one-tenth of an inch above upper line of the bottom frame place a dot.

8. Place another 5 inches higher on the same line extended.

9. Draw an arc of circle as long as the paper will allow and with 5-inch radius from this last point (8) as a centre. The needle is pushed through the 5-inch division on the rule just on a line with the upper ends of all the short divisions like the little perforation on the zero line. The point of the needle is now stuck into the dot (8) and the required arc drawn with the pencil point in the perforation. This arc, which is the parallel of 10° north latitude, may be numbered in the frames to right and left. It is drawn right across both frames intentionally. We need it so; but all other parallels and meridians will be drawn only from side to side of the inner square.

10. To draw the other parallels use always the same point (8) as a centre and always insert the needle there, but the needle is to pass through the rule at points each time 0.52 inch nearer the perforation than for the next parallel below. Thus for 20° , the radius will be 5.0"—0.52" or 4.48" and the interval is taken a little less than 4.5". For 30° , 3.96" is used, and so on. Draw the parallels up to 80° in this way, ending each at the inside line of the frame and number at both ends.

11. To draw the meridians lay off on the 10° parallel equal spaces of 0.56 inches to right and left from the 100° meridian out to the edge of the paper. Take the needle from the rule, stick it into the centre point (8) and placing the rule from this to the divisions just made on the 10° parallel, one by one, draw the meridians or the parts of them that fall within the inner frame. Now number the meridians and the net is ready for the map. As it very closely resembles the net on a six-inch globe in shape and size the map drawn on it will resemble that drawn on the globe very closely. The actual drawing of the map from any larger copy is very simple, working mesh by mesh. With a little practice it may be done very accurately.

Three of our measurements were essential.

The outer radius (to 10° N.).....	5.00
The 10° latitude difference.....	0.52
The 10° longitude difference on 10° N.....	0.56

These may be called the elements of the net and on them the accuracy of our work depends. The frame is of course not necessary, but adds to the neatness of the work, and in selecting a scale to work on that will suit our needs it is very convenient. Suppose for instance we are to use a sheet measuring 8 by 10 inches. Leaving an inch on each side for outer frame and margin we have a 6-inch square for our net. As this is half as long again on each edge as the one for which the elements are given, we shall use elements each enlarged in the same proportion; that is 7.50", 0.78" and 0.84".

ELEMENTS FOR CONTINENT MAPS, SCALE OF THE 6-INCH GLOBE

	Radius	Parallel	10° long.	10° lat.	Frame
North America	5.0063	10° N.	.5616	.5176	4 by 4
Europe	3.3879	30° N.	.4844	.5221	3 by 3
Asia	5.0063	10° N.	.5616	.5176	5 by 5
Australia	7.4328	10° S.	.5276	.5226	3.5 by 3
South America	9.0733	10° N.	.5675	.5159	3.5 by 4.5
Africa	∞		.5236	.4994	4.2 by 4.2

To illustrate suppose we wish to make a net for Australia on the scale of the six-inch globe that we use for a standard. Shortening the description, which may be made out by referring to the previous one, the steps are:—

1. Paper at least 5" by 9".
2. Middle meridian the long way of the paper.
3. Dots 3" apart, upper one 0.5" from top of paper.
4. Cross lines 3.5" long.
5. Rectangle 3 by 3.5".
6. Outer rectangle 0.2" outside.
7. Dot 0.2" *below lower* line of *upper* frame.
8. Another dot 7.43" lower for centre of circles.
9. Parallel of 10° S. from this centre with radius 7.43".
10. Radii successively 0.52" smaller, same centre.
11. Meridians distant 0.53" on 10° S.

Compare diagram D reduced to half size of standard.

This time the meridians converge downwards as they should for a southern continent. Any of these nets may be made of any desired size by multiplying the elements by the appropriate number. The earth is about forty-two million feet, the six-inch globe half a foot in diameter, so its scale may be said to be one eighty-four millionth of nature. To draw a map of Europe, for instance, on some other scale, as one ten-millionth, we have only

to multiply the elements given in the table by $\frac{11}{8}$ or 8.4, giving 28.45" longitude 4.07", latitude 4.38" and the frame 25" square.

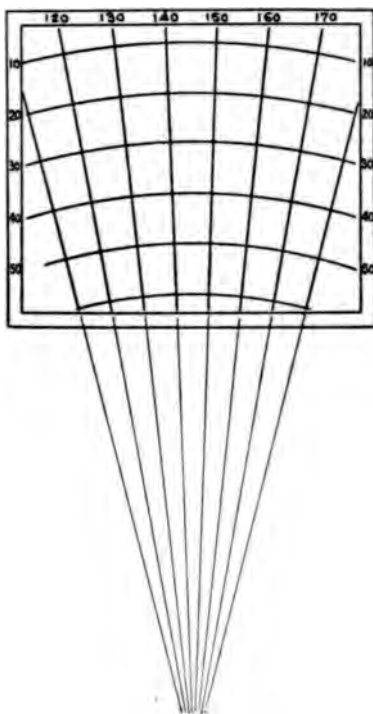


Fig. D.

Or suppose we wish to draw a map of Europe on which an inch shall represent a thousand miles for convenience in measuring distances. Our six-inch globe represents an earth 7912 miles in diameter. Each inch therefore stands for $\frac{7912}{6}$ miles, 1319 nearly. The required globe is larger in the proportion of 1319 to 1000. All lines on it therefore are 1.32 times longer than on the six-inch globe. Its diameter is 7.92", the elements of the required nets $R=4.47''$, $\text{long.}=0.64''$, $\text{lat.}=0.69''$. On such a map the rule divided to tenths of an inch makes measurements very simple. Similarly a multiplier 13.19 would give a net with a scale of 100 miles to the inch, a neat wall map 40 inches square.

For Africa the sign of infinity in the radius column suggests that the parallels are, for this continent, represented by straight lines and the meridians do not converge. The net thus becomes a rectangle divided into smaller rectangles, each measuring 0.50" by 0.52".

Asia extends further south of the 10° parallel than North America, so we put the dot in (7) nine-tenths of an inch above the upper line of the bottom frame. Another parallel—the equator—may also be added outside the 10° parallel.

To Find the Value of the Elements.—The reader has perceived that the nets we are using are conic projections. That is, the paper on which we

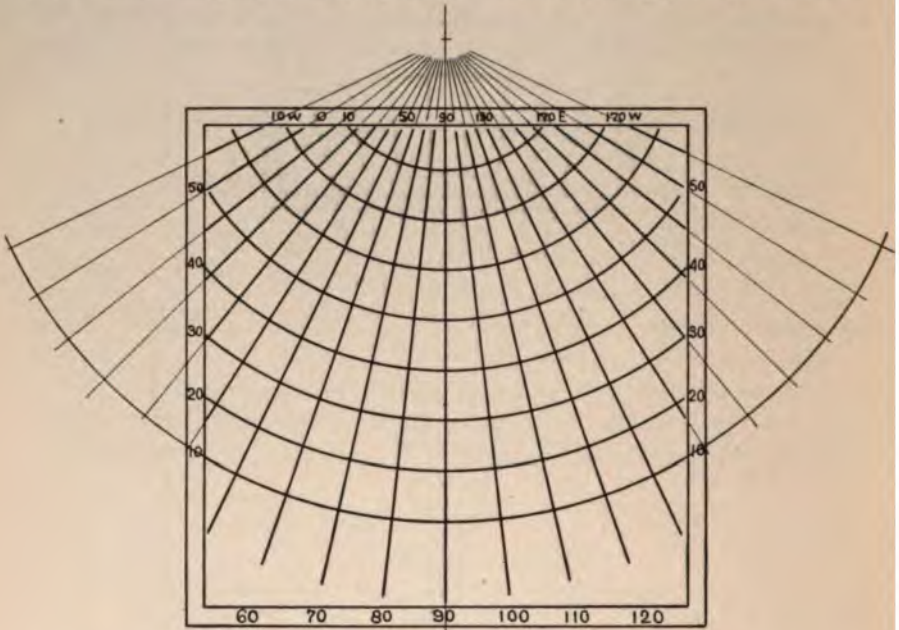
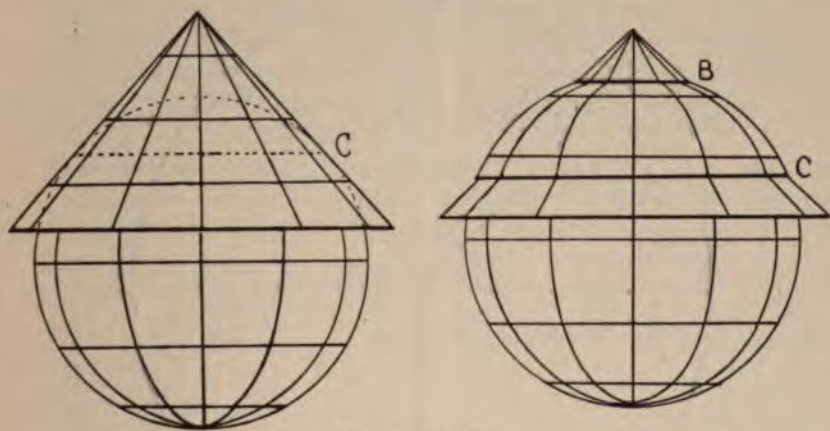


Fig. E.

have drawn our nets may be rolled so as to become part of a cone. A cone is very simply made of paper by cutting a sector from a circle and rolling the remainder so that the gap is closed up and the cut edges come together. For the common tin funnel of the kitchen a circle is cut in two on a diameter and each half rolled till the two halves of the straight edge on each come together. This makes two cones from each circle of tin and wastes no metal. For any belt of moderate width about the earth, some cone can be constructed that has a belt that can be put almost in coincidence with it. A very accurate drawing may be made on such a cone and the nature of the surface allows us to unroll it and lay it out flat as our books and maps must be laid and as we can never lay out any part of the surface of a sphere. The cone used may be either *tangent* as in Fig. F, where the two surfaces coincide only on the parallel passing through C, or *secant*, as in Fig. G where

they intersect on the two circles through B and C. It is evident that in the latter case the two surfaces come nearer coincidence. This is the cone on which our nets are drawn, as more accurate when considerable parts of the earth's surface are to be represented.

Let us consider the cone for drawing Europe. Europe lies mostly between the parallels of 40° and 70° north latitude. That gives it an extent of 30° of latitude. Fig. H. is a meridian section of a six-inch globe with Europe reaching from K to H. Divide the distance HK ($=30^\circ$)* into



Figs. F. and G.

quarters ($=7\frac{1}{2}^\circ$) and locate B and C $7\frac{1}{2}^\circ$ from H and K respectively. The arc BC is of 15° and so is the sum of the arcs HB and CK. ADD' is a cone so constructed as to cut the globe in the parallels through B and C. Through half of the latitude of Europe ($BC=15^\circ$) the surface of the globe is outside of the surface of the cone, but through the two quarters making up the other half (HB and CK) it is below. To find just where B and C should be placed on the circle, draw the equator and the polar axis at right angles to each other and lay off $47\frac{1}{2}^\circ$ and $62\frac{1}{2}^\circ$ from E with a protractor, these points being respectively $7\frac{1}{2}^\circ$ within 70° and 40° . We use a protractor of transparent paper, marking the points through with a needle point. The parallels through B and C are common to both cone and globe. On both they are the parallels of $47\frac{1}{2}^\circ$ and $62\frac{1}{2}^\circ$. On both they are 15° of latitude apart. If we lay our rule on the straight line BC and measure it we shall find 15° of latitude on the cone. Two-thirds of this will be the *latitude difference* required as one of our elements. As a

*Here reduced one-half in size.

number of points of Europe lie to the south of the parallel of 40° we will find where the 30° parallel comes on the cone.*

The required point will be $17\frac{1}{2}^\circ$ ($47\frac{1}{2}^\circ - 30^\circ$) from C. We have

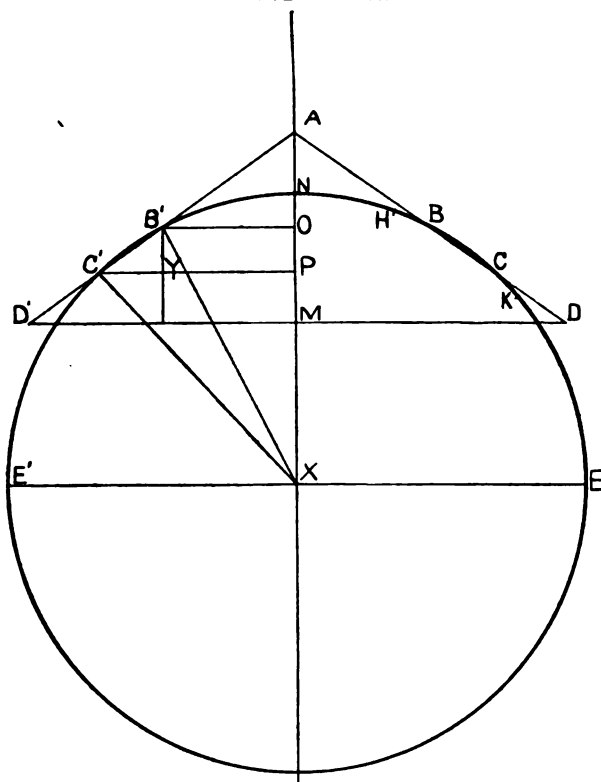


Fig. H.

just measured BC which represents 15° . Let us take $\frac{17\frac{1}{2}}{16}$ of BC from C outward and call the point D. If we now measure the line AD with the rule we learn another element, the *Radius to the parallel of 30°* , every point in that circle being that distance away from A. The remaining element is 10° longitude on the parallel through D or $\frac{1}{8}$ of the whole circumference of that circle. DM, the radius of the circle, must be measured. 2π DM will be the circumference and $\frac{2\pi D M}{8}$ is the required 10° or 0.1745 DM.

The construction has these parts:—

1. Construct a six-inch circle with two diameters at right angles.
2. Find the northern and southern latitude of your continent, its extent

*It may seem as if it could be found by laying off 30° from E with the protractor but this gives only the corresponding point on the globe.

in latitude, divide this by 4 and determine points $\frac{1}{4}$ of this latitude extent from the extreme latitudes.

3. Locate these points on the arc with a protractor.
4. Draw a line through these two points to the polar axis.
5. Measure BC and from it learn the *Latitude Difference* by taking the proper proportion.
6. Locate a suitable outer parallel (D) by measuring from C.
7. Measure AD for the *Outer Radius*.
8. Let fall DM perpendicular to the polar axis, measure DM and multiply by 0.1745 ($=\frac{\pi}{18}$) to get the *Longitude Difference*.

This construction gives accurate enough values for our purpose if care be used. The values in the table have been determined more closely by a calculation with simple trigonometrical ratios. This is now given with reference to the left side of diagram H.

Regarding the circle as of unit radius, OX and OB' are the sine and cosine respectively of the angle E'XB' ($=62\frac{1}{2}^\circ$), and PX and PC' are the sine and cosine of E'XC' ($=47\frac{1}{2}^\circ$). Then in the triangle B'YC',

$$B'Y = OP = \sin 62^\circ 30' - \sin 47^\circ 30' \text{ and}$$

$$C'Y = \cos 47^\circ 30' - \cos 62^\circ 30'.$$

$B'C' = \sqrt{B'Y^2 + C'Y^2}$ and from the similarity of the triangles B'CY and AC'P

$$AC' = \frac{B'C' \times C'P}{C'Y}$$

AD' as before $= AC' + \frac{17\frac{1}{2}}{18} B'C'$ and in the similar triangles AD'M and B'CY $D'M = \frac{AD' \times C'Y}{B'C'}$

$$10^\circ \text{ longitude on } 30^\circ \text{ north} = \frac{\pi}{18} D'M = 0.1745 D'M.$$

$$10^\circ \text{ latitude} = \frac{1}{3} (BC)$$

Each of the elements should now be multiplied by three to change them from the unit globe of the calculation to the six-inch globe required (3" radius). The calculation for Europe is added to show the arrangement of the work for logarithms.

EUROPE, sections at $47\frac{1}{2}^\circ$ and $62\frac{1}{2}^\circ$, D at 30° north latitude.

$$C'Y = PC' - PY = \cos 47\frac{1}{2}^\circ - \cos 62\frac{1}{2}^\circ$$

$$B'Y = OX - PX = \sin 62\frac{1}{2}^\circ - \sin 47\frac{1}{2}^\circ$$

$$B'C' = \sqrt{B'Y^2 + C'Y^2}, \quad AC' = B'C' \times \frac{C'P}{C'Y}, \quad D'M = \frac{AD' \times C'Y}{B'C'}$$

$\cos 47\frac{1}{2}^\circ$	[9.8296833]	0.675590	(1)
$\cos 62\frac{1}{2}^\circ$	[9.6644056]	0.461749	(2)
$\sin 62\frac{1}{2}^\circ$	[9.9479289]	0.887011	(3)
$\sin 47\frac{1}{2}^\circ$	[9.8676309]	0.737277	(4)
C'Y	[9.3300909]	0.213841	(5) = (1) - (2)
B'Y	[9.1753204]	0.149734	(6) = (3) - (4)

$\frac{C'Y'}{B'Y'}$	[8.6601818]	0.045728	(7)=(5) ³
$\frac{B'Y'}{B'C'}$	[8.3506408]	0.022420	(8)=(6) ³
$\frac{B'C'}{C'Y'}$	[8.8334531]	0.068148	(9)=(7)+(8)
$B'C'$	[9.4167265]	0.261052	(10)= $\sqrt{(9)}$
$\frac{1}{C'Y'}$	[0.6699091]		(11)= $\frac{1}{(5)}$
AC'	[9.9163189]	0.824743	(12)=[(1)]+[(10)]+[(11)]
$17\frac{1}{2}$	[1.2430380]	17.5	(13)
$\frac{1}{18}$	[8.8239087]		(14)
$\frac{17\frac{1}{2}}{18} \times B'C'$	[9.4836732]	0.304560	(15)=[(10)]+[(13)]+[(14)]
AD'	[0.0528104]	<u>1.129303</u>	(16)=(12)+(15)
$\frac{1}{B'C'}$	[0.5832725]		(17)= $\frac{1}{(10)}$
$D'M$	[9.9661748]	0.925070	(18)=[(17)]+[(16)]+[(5)]
2	[0.3010300]	2.	(19)
π	[0.4971503]	3.141596	(20)
$\frac{1}{16}$	[8.4436975]		(21)
10° on lat. 30°	[9.2080526]	<u>0.161455</u>	(22)=[(18)]+[(19)]+[(20)]+[(21)]
$\frac{2}{3}$	[9.8239083]	0.666666	(23) ^r
$\frac{2}{3} B'C'$	[9.2406348]	<u>0.174034</u>	(24)=[(23)]+[(10)]

Multiplying each element by 3, the radius of a six inch globe, we have:—

(16) AD	=3".387909
(22) 10° l. Lat. 30°	=0.484365
(24) 10° Lat.	=0.522102

The cone for Africa is to be regarded as of infinite altitude which makes it a cylinder cutting the globe in $17^\circ 30'$ north and south latitude. The geometrical construction offers no difficulty while the computation takes the form:—

$$\frac{2\pi \cos 17^\circ 30'}{3.6} \text{ for } 10^\circ \text{ longitude}$$

and $\frac{2 \sin 17^\circ 30'}{3.6}$ for 10° latitude, we divide by 3.5 since the distance between the points B and C this time is 35° , three and a half times as great as the interval of latitude wanted.

Tangent Cones.—In some cases, for countries of little extent in latitude, a simpler net may be used. The six-inch globe being too small for single country maps a scale of $\frac{1}{10,000,000}$ is adopted and a mesh of 2° , except for Switzerland and Michigan where 1° is used and for other small countries. This scale corresponds to a globe 50 inches in diameter.

To draw a net for Great Britain and Ireland.

1. Take paper at least $5\frac{1}{2}$ inches square, and pin it down on one end of a strip of manilla paper $5\frac{1}{2}$ by 24 inches.
2. Draw a middle meridian the long way of the two sheets.

3. Put two dots on the white paper, on the meridian, $5\frac{1}{2}$ inches apart and about equally distant from the ends of the paper.
4. Draw 4-inch cross lines through the dots and finish the rectangle by $5\frac{1}{2}$.
5. Draw another rectangle outside this for the outer frame.
6. On the middle meridian (4° W.) put a dot 2 inches up from the top line of the bottom frame.

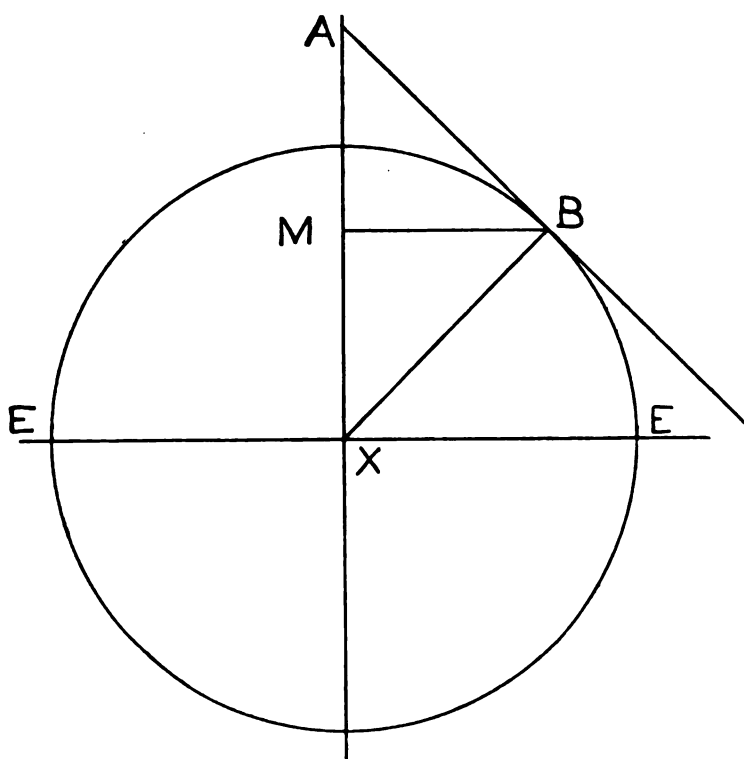


Fig. J.

7. Put a dot on the manilla paper 18.22 inches from this (6).
8. With this last as a centre draw the parallel of 54° , using 18.22 inches for radius and continuing arc all across the paper. Two rules pinned together give the requisite length.
9. Other parallels from 50° to 60° may be drawn using a latitude difference of 0.875".
10. Points are placed on the 54° parallel for meridians by using a 2° longitude difference on 54° of 0.514".

11. Draw meridians within frame and number.

The Parallel of 54° was the Tangent Parallel.—The values of the elements are found much as in the case of the secant cone. Suppose Fig. J to be a circle 5 inches in diameter with equator and polar axis and on one side of a tangent cone represented by AB. B is located by protractor near the proper middle latitude of the country. We did not use 55° for Great Britain because we were drawing only even numbered parallels and 54° which we were to draw is near enough to the middle British latitude. AB is taken from the diagram by direct measurement and is the radius. MB is measured and multiplied by $\frac{2\pi}{180}$ ($=0.03491$) to get 2° of longitude on 54°, while BX multiplied by the same quantity gives us 2° of latitude. But the circle we have measured was only 5 inches in diameter. To get elements for the 50-inch globe we must multiply the elements thus obtained by 10. The precise values are computed as follows:—

$R=25.0687''$ =radius of the globe on the given scale.

2° latitude= $\frac{2\pi \times 25.0687}{180} = 0.03491 \times 25.0687 = 0.8751$ for all countries alike on this scale.

AB=radius to tangent parallel= $R \cot BXE$,

BXE being the middle latitude of the country to be drawn.

AB= $25.0687 \cot BXE$.

2° longitude at B= $\frac{2\pi}{180} MB = 0.03491 MB = 0.03491 R \cos BXE$
 $= 0.03491 \times 25.0687 \cos BXE$,

values more easily computed than those of the secant cone.

A table is herewith given of the elements computed for some of the more important countries in these two ways.

Elements of conic Projections, Scale $\frac{1}{10,000,000}$

Intersecting Cones:

	Extent		Radius	2° l	2° lat	Divided parallel
Argentina	74 to 57 W	56 to 22 S	38.03	0.836	0.872	22 S
Brazil	34 to 74 W	4 N to 34 S	100.86	0.908	0.873	4° N
Chile	66 to 76 W	56 to 16 S	38.03	0.836	0.872	22 S
China	97 to 123 E	42 to 18 N	48.46	0.846	0.873	18 N
India	66 to 101 E	38 to 6 N	67.20	0.897	0.872	6 N
Mexico	89 to 115 W	15 to 33 N	60.63	0.858	0.876	14 N
Scandinavia	4 to 30 E	72 to 54 N	17.09	0.670	0.870	53 N

Tangent Cones:

France	8 E to 6 W	42 to 52 N	24.21	0.608	0.875	38 N
Germany	4 to 24 E	46 to 56 N	19.58	0.539	0.875	52 N
Great Britain	2 E to 10 W	50 to 60 N	18.22	0.514	0.875	54 N
Italy	6 E to 20 E	36 to 47 N	27.84	0.650	0.875	42 N

Japan	128 to 146 E	46 to 30 N	32.09	0.689	0.875	38 N
Spain	4 E to 10 W	36 to 44 N	29.87	0.670	0.875	40 N
One degree meshes						
Michigan	82.5 to 90.5° W	41.5 to 48.5 N	25.07	0.310	0.438	45 N
Switzerland	6 to 11 E	44 to 48 N	23.38	0.298	0.438	47 N

If a habit be made of much map drawing it will often be desired to give the class ready-made nets. A net may be made for this purpose to embrace rather more than the area of one continent and on this any land or any

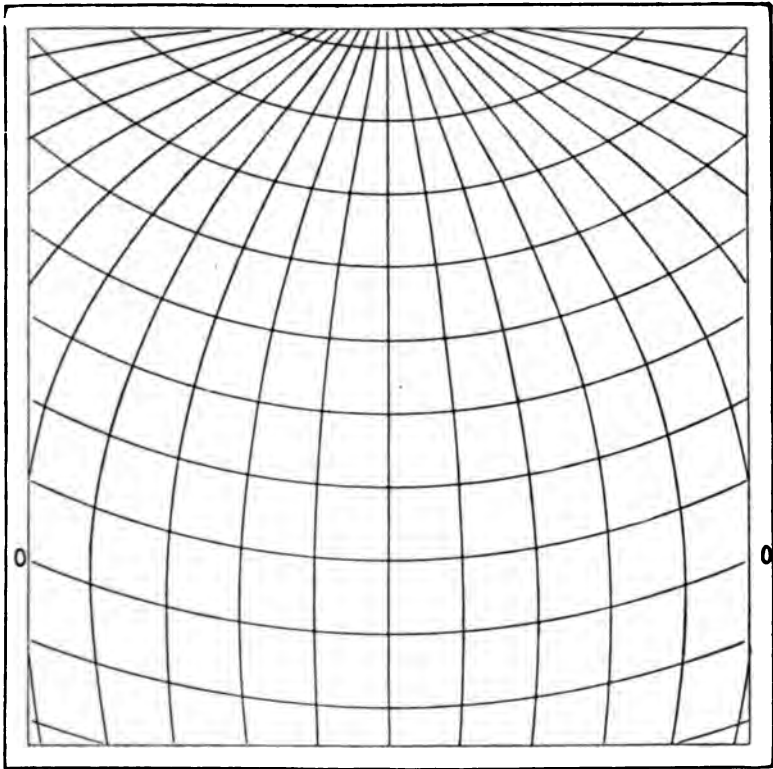


Fig. K.

ocean may be placed. Fig. K is such a universal net reduced from one of those used with our Ypsilanti classes on the scale of the 9-inch globe. To prevent the distortion inevitable in the outer parts of conic nets when they are of great extent, the meridians have been drawn as curves, giving the longitude space on each parallel the same value it has on the corresponding globe.

THE MIGRATION OF BIRDS AS A SUBJECT FOR GEOGRAPHY STUDY

BY SPENCER TROTTER
Swarthmore College, Pa.

THE migratory movement of birds has a geographical as well as an ornithological point of view. To most persons and to ornithologists especially, the interest in this phenomenon must largely lie in the remarkable instinct that impels the bird to travel thousands of miles by land and sea, and in the no less remarkable power of orientation—the guiding sense—that leads the bird from one locality to another over long distances, and this too, in the great majority of cases, in the darkness of night. There is also much that might be learned in the way of geography from the study of bird migration; and it is the purpose of this paper to set forth some of the facts which have been gathered of late years as to the routes taken by migratory birds and the geographical features which influence and condition the movement.

It has seemed to me that there is much good matter in the subject of bird migration that might well be presented to a class in geography study. There is an element of mystery and adventure about the migrating bird that lends a certain interest and color to the bare geographical facts. Let me illustrate by an example. A number of years ago, when I used to shoot bay snipe on the south shore of Long Island, there was always the possibility of falling in with one of those remarkable flights of the golden plover that occasionally happened sometime during the month of August. These flights or 'waves' would suddenly appear in the neighborhood of Montauk Point, spread along the shore and as suddenly vanish, appearing nowhere again along the entire Atlantic border of the United States. Where did these plover flocks come from and whither did they go? It was not until the past few years that the question was solved, and even yet many of the features of this great migratory flight are wrapped in mystery. Mr. Wells W. Cooke of the Biological Survey in a reprint from the Department of Agriculture's Year Book for 1903 entitled "Some New Facts About the Migration of Birds" has given, among other interesting matter, an account of what is now known about this remarkable plover migration. I cannot do better than quote Mr. Cooke's own words.

"As already stated, the longest migration route is taken by some of the wading birds, especially the American golden plover, the Eskimo curlew, and the turnstone. The journey of the plover, which is typical, is won-

derful enough to be given in detail. In the first week of June they arrive at their breeding grounds in the bleak, wind-swept 'barren grounds' above the Arctic Circle, far beyond the tree line. Some even venture 1,000 miles farther north (Greely found them at latitude 81°). While the lakes are still icebound, they hurriedly fashion shabby little nests in the moss only a few inches above the frozen ground. By August they have hastened to Labrador, where, in company with curlews and turnstones, they enjoy a feast. Growing over the rocks and treeless slopes of this inhospitable coast is a kind of heather, the crowberry, bearing in profusion a juicy black fruit. The extravagant fondness shown for the berry by the birds, among which the curlew, owing to its greater numbers, is most conspicuous, causes it to be known by the natives as the 'curlew berry.' The whole body of the curlew becomes so saturated with the dark purple juice that birds whose flesh was still stained with the color have been shot one thousand miles south of Labrador.

"After a few weeks of such feasting, the plovers become excessively fat and ready for their great flight. They have reared their young under the midnight sun, and now they seek the Southern Hemisphere. After gaining the coast of Nova Scotia they strike straight out to sea, and take a direct course for the easternmost islands of the West Indies. Eighteen hundred miles of ocean waste lie between the last land of Nova Scotia and the first of the Antilles, and yet six hundred more to the eastern mainland of South America, their objective point. The only land along the route is the Bermuda Islands, eight hundred miles from Nova Scotia. In fair weather the birds fly past the Bermudas without stopping; indeed, they are often seen by vessels four hundred miles or more east of these islands. When they sight the first land of the Antilles the flocks often do not pause, but keep on to the larger islands and sometimes even to the mainland of South America. Sometimes a storm drives them off the main track, when they seek the nearest land, appearing not infrequently at Cape Cod and Long Island.

"A few short stops may be made in the main flight, for the plover swims lightly and easily and has been seen resting on the surface of the ocean; and shore birds have been found busily feeding five hundred miles south of Bermuda and one thousand miles east of Florida, in the Atlantic, in that area known as the Sargasso Sea, where thousands of square miles of seaweed teem with marine life.

"Though feathered balls of fat when they leave Labrador and still plump when they pass the Bermudas, the plovers alight lean and hungry in the Antilles. Only the first, though the hardest, half of the journey is over.

How many days it has occupied may never be known. Most migrants either fly at night and rest in the day or vice versa, but the plover flies both night and day.

"After a short stop of three or four weeks in the Antilles and on the northeastern coast of South America, the flocks disappear, and later their arrival is noted at the same time in Southern Brazil and the whole prairie region of Argentina almost to Patagonia. Here they remain from September to March (the summer of the Southern Hemisphere), free from the responsibilities of the northern summer they have left. The native birds of Argentina are at the time engrossed in family cares; but no wayfarer from the north nests in the south.

"After a six months' vacation the plovers resume the serious affairs of life and start back toward the Arctic, but not by the same course. Their full northward route is a problem still unsolved. They disappear from Argentina and shun the whole Atlantic coast from Brazil to Labrador. In March they appear in Guatemala and Texas; April finds their long lines trailing across the prairies of the Mississippi Valley; the first week of May sees them crossing our northern boundary; and by the first week in June they reappear at their breeding grounds in the frozen north. What a journey! Eight thousand miles of latitude separates the extremes of their elliptical course, and three thousand miles of longitude constitutes the shorter diameter, and all for the sake of spending ten weeks on an Arctic coast."

How can all this interesting matter about the plover be applied in a course of geography class work? In the first place the breeding range of the bird—the "barren grounds" of Arctic America—is to be considered; its climate, prevailing winds, and other physical features, and its life; reason for the name "barren grounds"; the Arctic day, the short summer, and the midnight sun; the abundance of food, character of the vegetation, and the insect life; why the birds leave early, and other interesting questions. The coast of Labrador, its features, fisheries and people. Nova Scotia, its geographical position and features. Under the head of the ocean route the Western Atlantic should be studied—absence of any large islands noted; nearest land to the line of flight; prevailing winds, the storm tracks and the fog bank, and why the birds occasionally appear on Cape Cod and Long Island. The position of the Bermudas and the physical features of these islets. The Sargasso Sea—its extent and characteristics (its historic reference in the voyage of Columbus). The Antilles in like manner would claim attention. Then the continent of South America—its physical features and configuration as a whole; the great rivers and the tropical forest

region (the selvas of the Amazon); the pampas region of Argentina—its climate and life features. Lastly, the Mississippi Valley as the path of the return migration in the spring; the prairie country and its food supply; the physical features of the central United States and of Canada.

Here is an array of the most interesting and varied geographical matter made vivid and personal by the migratory flight of this remarkable bird. Nor is the plover alone remarkable. The path of every migrating bird holds a lesson in geography. One is led by the survey of such facts into wider fields of thought and observation. Geography thus becomes linked with nature study in one of its most attractive aspects.

The bobolink affords another interesting example. Well known in rural New England and throughout the northern country generally as a bird of spring and early summer, conspicuous alike for its striking color pattern and its voluble medley of song, it is equally famous for its long migratory journey. It passes south in large flocks during the early autumn and is known by the inhabitants of the Middle Atlantic States as the reed bird—from its habit of frequenting the river marshes where it gorges itself on the wild oats until its fat body becomes a toothsome dainty, eagerly sought for by the epicure. In the Carolinas and along the Southern Coastal Plain it is known as the rice bird. Arriving on the Florida coast these flocks launch forth over the waters of the Mexican Gulf to Cuba, a distance of one hundred and fifty miles. From Cuba they pass on to Jamaica, a stretch of ninety miles, and then begins their great voyage across the Caribbean Sea, five hundred miles to the mainland of northern South America, with no rock or islet as a stopping place. "Indeed," as Mr. Cooke remarks, "many bobolinks appear to scorn the Jamaican resting point and to compass in a single flight the seven hundred miles from Cuba to South America. With the bobolink is an incongruous company of traveling companions—a vireo, a kingbird, and a nighthawk that summer in Florida; the queer chuck-will's-widow of the Gulf States; the two New England cuckoos; the trim Alice thrush from Quebec; the cosmopolitan bank swallow from frozen Labrador, and the black-poll warbler from far-off Alaska. But the bobolinks so far outnumber all the rest of the motley crew that the passage across the Caribbean Sea from Cuba to South America may with propriety be called the 'bobolink route.' Occasionally a mellow-voiced wood thrush joins the assemblage, or a green-gold tanager which will prepare in the winter home its next summer livery of flaming scarlet. But the 'bobolink route' as a whole is not popular with other birds, and the many that traverse it are but a fraction of the thousands of North American birds that spend the winter holiday in South America."

The main route of migration appears to be along the western shores of the Mexican Gulf and from Cuba to Yucatan, and for a very obvious reason—a continuous land mass and an abundant food supply.

The Eastern Hemisphere affords similarly much interesting matter relating to bird migration. Many of the migratory birds of Western Europe spend the winter in Northern Africa and Palestine. The Sahara offers an impassable barrier to their further southward range. Here is an interesting point for comparison with the Western Hemisphere where no such desert zone exists. It has long been observed that migrating birds cross the Mediterranean at three points only—(1) at Gibraltar, (2) by way of Sicily and Malta, and (3) through the Grecian isles and Cyprus. These three routes correspond to the three ancient land bridges that once connected Europe with Northern Africa, but which have since been submerged, forming ridges now covered by comparatively shallow depths of sea.

Such a well known bird as the nightingale has been cited by Wallace as a typical migrant. The nightingale winters in the Jordan Valley, throughout the region of Asia Minor in general, and in Northern Africa. "Early in April it passes into Europe by the three routes already mentioned and spreads over France, Britain, Denmark, and the south of Sweden, which it reaches by the beginning of May. It does not enter Brittany, the Channel Islands, or the western part of England, never visiting Wales, except the extreme south of Glamorganshire, and rarely extending farther north than Yorkshire. It spreads over Central Europe, through Austria and Hungary to Southern Russia and warmer parts of Siberia, but it nevertheless breeds in the Jordan Valley, so that in some places it is only the surplus population that migrates. In August and September all who can return to their winter quarters." (See Wallace—"Geographical Distribution of Animals" (Vol. I., p. 21).

This, I think, would make remarkably attractive matter for a class in geography when studying the old world. The nightingale is one of the birds that has a strong human interest. It has been immortalized in English poetry, and it is interesting to note in this connection that Keats in his "Ode to a Nightingale" makes allusion to the bird's distribution in Palestine:

"Perhaps the self-same song that found a path
Through the sad heart of Ruth, when sick for home,
She stood in tears amid the alien corn;"

The teacher who may become interested in this subject should obtain from the Biological Survey of the Department of Agriculture at Washington the various reprints relating to migration, particularly the aforemen-

tioned paper by Mr. Cooke and also his work on "Warbler Migration." These, if in print, may be had without cost on application. Other books which the teacher should have access to are Chapman's "Handbook of the Birds of Eastern North America" and Mrs. Bailey's "Handbook of the Birds of Western North America" for identification of different birds and for information regarding their habits, distribution, and so forth. Any good library should be able to supply books dealing with the various countries under consideration. It is needless to refer to Poole's Index as a guide to current periodical literature where much valuable information may be obtained. The organizing of such material for class work must lie mainly in the hands of the teacher. Each one will have his or her individual way of taking hold of the subject. A number of good wall maps are essential for tracing out the routes of migrating birds before a class, and outline maps might be used in the same way by pupils. A good picture or a specimen of the bird under consideration would be a very happy feature of the work. Reading about the bird in class by the teacher or the pupils would of course be to the point, and the pupils should be questioned as to whether any one knows the bird and can tell anything about it. Some boys and girls are surprisingly well informed about birds.

There is no claim that this study of bird migration is to replace in any way the regular class-room work in geography. It is merely in the hope of supplementing the more formal and necessary routine, along the line of a new interest, that I have been tempted to present this attractive subject to readers of the JOURNAL.

THE CENTURY PLANT IN MEXICO

The maguey, or century plant, is native to the highlands of Central Mexico, ranging from 6,000 to 7,000 feet altitude. At present the plants are grown on large plantations, or haciendas, thousands of acres being devoted to its cultivation. From it the Mexican Indian obtains the native beverage, *pulque*, and a fiber that, as Mexican fiber, is used for making rope, cordage, bagging, matting, thread, clothing, hammocks and other coarse textile stuffs.—*Bulletin, Geographical Society of Philadelphia*, April, 1906.

EDITORIALS

THE SAN FRANCISCO MEETING OF THE NATIONAL EDUCATIONAL ASSOCIATION

THE National Educational Association will hold its annual meeting this year in San Francisco, Cal., from July 7 to July 14. A special rate of one fare, plus two dollars for membership in the Association, is offered for the round trip with practically unlimited stop-over privileges west of Missouri River points. Tickets will be good from Chicago from June 25 to July 6 and from New York from June 24, with return privilege to September 15.

In addition to these unusually favorable rates special excursions will be offered about California at rates of one and one-third fare for round trip.

This is an opportunity to see the United States rarely offered and should be seized by all teachers, and especially by all teachers of geography, who can possibly make arrangements to do so.

The trip across the continent is in itself an education to all who do not know the wonders of the Great West and any teacher, however uninterested in geography, will gain experiences of great value in her class-room work if she will but look at the scenery as she rides rapidly through the country. These experiences will be greater and richer if one route is followed in one direction and another in the other direction.

The Pacific States are full of scenic features that should be seen leisurely and as thoroughly as possible. The view even of San Francisco and its wonderfully beautiful harbor is in itself not the least of the scenic beauties of this far famed region.

Any who contemplate taking the trip should secure from the Secretary of the Association, Mr. Irwin Shepard, Winona, Minn., a copy of the preliminary announcement of routes and probable cost of the trip. Inquiry of any agents of the great transcontinental railroads will bring full and prompt answer to any detailed questions. Such inquiries should be made at once so that time may be taken to plan one's itinerary slowly and carefully. Many personally conducted excursions will also be run from the larger cities of the country, details of which may be secured from the State representatives of the National Educational Association.

The supposed object of the excursion is to attend the meetings to be held in San Francisco but more geography will be learned from the trip than from the meetings, though geography teaching will have a place on the program, as will be announced in detail later.

The trip in itself is an investment which will repay all who want to see new country, meet new people, come in contact with the spirit of a new region and be refreshed by getting away from the hackneyed surroundings of everyday life in even the most favored localities.

It is to be hoped that teachers will go to San Francisco in large numbers and gain as much profit as possible from all phases of the trip. After the journey is planned an effort should be made to find out before going what may be seen en route. Seek reliable and unbiased information expressed in simple language and do not be content merely with the railroad announcements with their superlative descriptions. Often the points of greatest interest and worth to a traveler are not even mentioned by the railways in their advertising matter. There is much to be seen as interesting as scenery and Indians, and equally helpful in geography teaching or as a contribution to one's general information.

An accurate guide book is an essential traveling companion but it should be studied carefully before the start is made so that nothing worth seeing is missed if it can be avoided. Supplement the guide with all the illustrative material available and save all the best descriptive matter for use in the class room or in reminiscing afterwards. An excursion across the country may be a globe trotting jaunt or it may be an education. Forethought and a reasonable amount of preliminary study will make it an education of great worth to all.

GEOGRAPHY MADE EASY

In the present day efforts are being made to develop an "easy" method of teaching geography by following some scheme of organizing the materials so that the geographic character of the items will be obscured. Geography will be acquired most easily, not when it is presented so that it can be temporarily absorbed, but not assimilated, without any effort, but when it is made vital and real and hence obviously worth studying, and presented in such a way that the pupils do not *waste* any effort in their study. It is not possible to make geography easy by adopting some particular "method" of study, for geography, like other subjects, must be taught in different ways at different stages of a pupil's progress. A teacher who follows a "method" shows that she is neither a master of her subject or of the principles of good teaching. A teacher who adapts her ways of presenting a subject to the special problem of the moment is making her "methods" her servants, is teaching her subject well and hence making the later work "easy" because the pupils are being trained for the race to be run.

REVIEW

AN INTRODUCTION TO PRACTICAL GEOGRAPHY.—By A. T. Simmons and Hugh Richardson. Exercises 218. London and New York: Macmillan and Co., 1905.

AFTER a careful examination of the volume noted above, those most skeptical of the value of geography except as a culture subject must acknowledge its disciplinary character in the best sense of that much abused word.

It is not a "complete" geography. There is practically no descriptive matter, no regional work, nor is it a discussion of subjects usually presented in physical geography. It is a collection of exercises in "practical geography" or an admirable handling of the facts of everyday experience and a marshalling of these facts in such a manner that the underlying principle may be deduced. It trains to close observation, necessitates simple experimentation and requires accuracy of thought and of execution that correct results may be attained.

The exercises are divided into four sections. The first, treatment of maps, the second, of the globe, the third, of climate and the fourth, of certain features of the land and the sea. While the topics presented are similar to those found in the various manuals of physical geography there is a marked difference in treatment. In the volume under discussion much of the work requires true mathematical precision. To illustrate, not only is a careful study of various maps required, as is the case in most manuals, but map making in the field is taught.

The problems are adapted to pupils in the higher grades of the elementary school and to the early years in a high school course. With the younger pupils certain modifications must be made and perhaps some topics eliminated altogether.

The course here presented is in no sense a substitute for that outlined in the geographies generally in use in the upper grades of the elementary school nor for the physical geography of the high school. It should be used, as the authors suggest, in connection with the prescribed course or perhaps as a parallel line of work.

The fact that the book is an English publication, prepared especially for the pupils of the United Kingdom, is in many respects an advantage rather than a detriment as one might at first suppose. It is for this reason, perhaps, more suggestive than the majority of our laboratory manuals of physical geography which have appeared within recent years. The latter

are characterized by a certain uniformity of treatment, valuable perhaps for the co-ordination of the course of study throughout the country, but they fail in freshness and in originality of treatment and are therefore less suggestive than is this "Introduction to Practical Geography."

C. B. K.

RECENT PUBLICATIONS

HOW WE ARE SHELTERED; A Geographical Reader. By J. F. Chamberlain. pp. viii+184. New York, The Macmillan Company, 1906.

Companion volume to *How We are Clothed, How We are Fed*, by the same author. Includes chapters on the more striking forms of houses in the world and on the materials used in house construction, lighting and heating. Simple, readable and helpful. Illustrations in general well chosen, but often poorly reproduced so that their value is much lessened. Lacks an index, an unfortunate omission not to be offset by a table of contents.

MARYLAND. By M. W. Twitchell; **NEW JERSEY.** By R. H. Whitbeck, being supplementary volumes to accompany the Tarr and McMurry Geographies. Well arranged and valuable for reference beyond the regions for which primarily written. The volume on Maryland is somewhat formal and unindividual. The volume on New Jersey shows the hand of the experienced and suggestive teacher as well as the well trained geographer.

COURSE OF STUDY AND SYLLABUS FOR ELEMENTARY SCHOOLS, published in Supplemental Volume of Annual Report (1905) of Education Department of State of New York, Albany, (1905).

Contains (1) 32-page consideration of geography course, including outline of Home Geography for rural and for city schools. Suggestive and helpful. Includes brief reference lists for pupils and teachers.

(2) Syllabus on Physical Geography for Secondary Schools, 28 pages. A formal and over inclusive outline followed by brief suggestions as to seventy laboratory exercises.

LES TREMBLEMENTS DE TERRE, by F. de Montessus de Ballou. pp. 500. Paris, Armand Colin, 1906.

A comprehensive consideration of the features of earthquakes and of their regional distribution. A volume for the expert geographer and geologist.

A TEXT BOOK OF COMMERCIAL GEOGRAPHY, by Cyrus C. Adams. Revised Edition. pp. xvi+506. New York, D. Appleton & Co., 1905.

The revised edition of Adam's popular and reliable Commercial Geography includes a series of review questions at the ends of certain chapters and certain brief additions to the text. The most important map has been brought up to date, statistics have been generally revised, though much more could have been done to advantage in this regard and the latest information in reference to the value of products of the United States has been added as foot notes to the diagrams.

NOTES

SOME OBSERVATIONS ON THE RAISING OF THE MEHARI AMONG THE CHAANBA MOUADHI.—The méhari being but a dromedary of a purer and more refined type, to eliminate entirely the common camel, his brother less favored by nature—would be to deny the parental bonds which unite the two. As they have numerous points in common, we are often led to speak of the camel in a general manner while wishing to make allusion but to the méhari, the object of our study.

A ruminant mammifer, the dromedary or African camel (*camelus dromadarius*, Lin.) is a large and robust animal with a dorsal protuberance, a long, curved neck, and a large callosity (kerkra) on its hind quarters, on which it rests when it is in a recumbent position. It has fleshy toes joined to a common sole, a tail resembling that of a cow, small ears set on a head relatively equally small and great gentle eyes surmounted by high arched eyebrows. Its size varies from 2m 30 to 2m 60. The length of the body, measured from behind the head to the beginning of the tail, attains 3m 50 and even 4 meters in the most highly developed cases. The color most in demand is fawn and tawny yellow; the gray and white are more rare and the latter color is especially prized because of its rarity and beauty. The Arabs maintain that the rough, curly hair among the camels is an indication of great patience.

By his steadiness, endurance and strength, the camel embodies the perfect type of the quadruped created for the desert; an animal most useful for arid regions, it thus plays the most important rôle in the life of the desert dweller. Its existence is closely bound up with that of the nomads of the Sahara; it is not only their beast of burden, carrying merchandise, domestic equipment and provisions, but their munitions of war and travel; nay, even the supplier of their needs, for this animal furnishes the meat and milk for their nourishment, its hide and hair form their tents and other utensils of the first importance for their wandering life.

There are distinct varieties of camels, characterized by certain differences of aptitude and of conformation and consequently by the kind of work which each of them is destined to perform.

These two forms are: the *djemel* or pack camel and the *méhari* or riding camel.

The *djemel* or pack camel is a heavy, strong beast, the essential elements for caravan transports; he can carry as much as three quintaux; but the ordinary weight of his load is from 150 to 200 kilos; his progress is slow,

with a rather irregular step, because the drivers let their animals walk freely and browse in marching, and varies from two and a half to five kilometers an hour, depending on the character of the land and the action of the driver; it never exceeds this latter and is ordinarily four kilometers an hour.

The méhari, as many authors have said, is to the pack camel, the djemel, what the race horse is to the draught horse. Better made, more svelte and active, it has longer legs, its neck is more slender and its head better formed; its legs are very thin toward the lower part but muscular from ankle to hip; the sole of its foot is small, as well as its hump and tail. The Arabs say of it that "it has the graceful ears of the gazelle, the supple neck of the ostrich and the body of the greyhound."

Our Chaanba Mouadhi do not own such perfect animals. This is due above all to the conditions of their poverty. On the contrary, from time immemorial, the Touareg, who live by pillage, traverse enormous distances in the course of their depredations and are sometimes called to cross, during many days, regions more desolate and without resources than our Sahara.

The instrument of which they avail themselves (the méhari) is adapted to these conditions and these nomads have thus become possessed of mounts of an extraordinary endurance and steadiness. When the méhari chaanbi cannot go without drinking more than four or five days, the méhari targui can last easily twelve or fifteen days. But, as we have said, the reason appears to be that the Chaanba Mouadhi have not asked as much of their beasts as the Touareg.—*Bulletin of the Geographical Society of Algiers.*

THE CIRCUMFERENCE OF THE EARTH.—During the writer's time of service in the New Bedford, Massachusetts, High School, a class in Physical Geography essayed the problem of obtaining the circumference of the earth by the principle of Eratosthenes, as suggested by Davis (*Physical Geography*, 387). As a collaborating station, Roxbury, Massachusetts, was selected. The results of the exercise were as follows:—

	New Bedford, Mass.	Roxbury, Mass.
Date	Jan 10, 1903.	Jan 10, 1903.
Length of upright	27.3 cm.	6 feet.
Length of shadow	55.2 cm.	12 feet 6 in.
Observer	R. M. B.	I. H. U.

Natural tangent of the angle (sun declination), for New Bedford equaled 55.2 divided by 27.3, or 2.0219; for Roxbury, 12.5 divided by 6, or 2.0833.

These natural tangents yield $63^{\circ} 41'$ in the former case, and $64^{\circ} 21' 32''$ in the latter.

The difference in sun declination is 40' 32".

The distance from Roxbury to New Bedford (measured on the topographic maps, U. S. G. S.) equals 47 miles exactly.

From this data the proportion is as follows:—

$40\frac{53}{60} : 360 :: 47 : x$ (circumference of earth).

x equals 25,046 miles.

R. M. B.

THE TEACHING OF CLIMATOLOGY AND METEOROLOGY IN THE UNITED STATES.—About 1,000 *graded schools* teach the elements of climatology as a part of geography, receive the daily weather maps, and give talks upon their use in forecasting the weather. About 7,000 *high schools*, or seven-eighths of the whole number, teach the elements of meteorology and climatology in connection with physical geography or physical geology.

The replies to a circular letter recently sent to 177 public normal schools in the United States indicate that in about 25 meteorology and climatology are taught in specific courses; in about 115 these subjects are taught in connection with physical geography or some other allied subject, and in the remaining 37 these subjects are not touched upon.

As to colleges and universities, out of 245 replies 49 state that they have specific courses in meteorology, 95 teach meteorology in connection with some other subjects, and 101 pay no attention to the subject. The corresponding percentages are 20, 39, and 41; probably the replies from other colleges and universities will not alter these ratios very much.

These numerical statistics show that attention to our science has been awakened: in fact, it is receiving a steadily-increasing amount of recognition. In fully one-half of these institutions, from the lower schools to the higher universities, some form of laboratory method is pursued—that is to say, students are required to make personal observations, experiments, and deductions. They study the daily weather map and develop habits of individual thought. In a matter that is so complex as the weather, no textbooks can replace the daily map, personal observations, and independent study.—*From a Paper given by Professor Cleveland Abbe before the Association of American Geographers.*

HOW WE TEACH GEOGRAPHY TO-DAY.—There has been vast improvement in the teaching of geography in grammar schools during the last ten years. Evidences of this are:

1. Better courses of study. Compare the courses recently adopted in New York and Chicago, and the suggested course for Boston with the courses arranged ten or fifteen years ago.

2. A more general recognition on part of school superintendents and

other educators that geography is a useful and valuable study, and should receive its proper amount of time and attention.

3. Methods of teaching which are better adapted to the child mind. A different and better arrangement of subjects is followed. In the best schools, observation and reading precede systematic study. Much reliance is placed upon supplementary reading.

4. The use of field and observational work in teaching type forms and other geographical facts instead of definitions, text-books, and even pictures and moulding boards. Classes are taken into the field and shown a real hill, valley, brook, island, etc.

5. Concrete teaching of geography instead of abstract. The "what" is studied first and the "why" afterwards. Facts and results are learned before generalizations are made. The deductive method is largely employed.

6. The stimulation of the imagination of children by their description of journeys and scenes in foreign lands.

7. The prominence given to human geography; that is, study of the people.

8. The attention given to what the people do, and how they get a living; that is, to commercial geography.

9. The use of the eye in teaching geography to-day and less reliance upon memorizing. Globes, maps, and other useful apparatus, pictures, with stereopticon and stereoscope are constantly employed.

10. Topical study of the subject instead of a close following of text-books.

11. Careful consideration and explanation of causal relations.

12. Consideration of the natural activity of the child. He is given plenty of work in making sensible maps, writing imaginative letters from other countries; studying subjects or countries especially assigned to him; in making scrap-books, and compiling home-made geography.

13. The fact that best teachers of geography to-day make the end and aim of their teaching to form five habits or to develop five powers:

a. The observational power or habit.

b. The reading power or habit.

c. The studying power or habit.

d. The reciting power or habit.

e. The reproducing power or habit shown in writing or drawing.

All this may be summed up in the term, "development of geographical expression."

The best and most scientific teaching of geography to-day is undoubt-

edly found in the normal schools of the country, and credit is due them for the influence they exerted in bringing about the improvement in grammar school teaching.—*American Education*, February, 1906.

HUGE CONSUMPTION OF WOODEN FENCE POSTS.—The difficulty of obtaining fence posts at reasonable prices has given an impetus scarcely realized to forest planting in the Middle West. Newspapers, farmers' institutes, women's clubs, and boards of trade throughout the region are pointing out the need of such material and dwelling on the profit realized by the few men who planted trees years ago and whose plantations have been successful. The local supply of all forest products is insignificant, and timber, if not grown at home, must be imported. With the continuous retreat of the sources of supply under the attack of the vigorous demand, the length of the haul increases and the cost of transportation rises higher and higher. Yet the fields and pastures must be fenced. The posts must be had.

The annual production of fence posts in the regular logging camps of the country, as reported by the last census, is 8,715,661. How many times greater than this is the annual cut from the home woodlot no figures exist to show; but by taking the total number of farms and their acreage and making a conservative allowance for posts for the fences inclosing each farm, it has been estimated that upwards of 1,000,000,000 posts are set each year. Such figures are too vast to mean anything. Even the nine million posts of the Census, a mere drop in the bucket as compared with the unreported production, would, if set 15 feet apart, girdle the earth, or would build a solid pile 55 feet wide, 40 feet high, and a mile long.

Durability and at least moderate strength are the desirable qualities for fence posts. The use of species which are not durable is expensive, both on account of the more frequent renewal which is necessary and because repairing is constantly called for. Timber of the required quality is produced in the Middle West by hardy catalpa, black locust, and Osage orange.

Catalpa makes an excellent growth on deep, porous, fertile soil, but only on such soil. Five or six inch posts should be ready to cut in about ten years. In regions immune from the locust borer, black locust will yield satisfactory returns from soil in which catalpa would fail, and for this reason it is adapted to a wide area where the rainfall is light. Under ordinary conditions, locust should produce fence material in fifteen years.

Osage orange also is not exacting in its soil requirements. It is being extensively planted for hedges and windbreaks, from which a considerable yield of fence posts may be obtained. It makes satisfactory growth on dry soils and reaches post size in from fifteen to twenty years.

Several other species, such as white willow, European larch, Russian mulberry, and red cedar, are also being grown with good results, but none of them is better fitted to supply fence posts than those first named.

The Forest Service fully recognizes the importance of fence posts in farm economy and the great demand for suitable timber. Studies of the growth and durability of various species have been made, and the limits of the commercial planting range of each has been more closely defined. Rapid growing species which are not durable have been studied to determine some form of preservation treatment which will increase their durability. Further work along this line will undoubtedly add largely to the list of species which can furnish the desired product.—*Forestry and Irrigation*.

TIMBER IN ARIZONA.—The treeless areas of the Southwest are so vast that it is difficult to realize that in Arizona, the heart of the "Great American desert" lies the largest unbroken forest in the United States, probably the largest in the world. The forest of yellow pine, flung like a kingly mantle over the rough, mountain-ribbed Mogollon plateau, has given northern Arizona a character and development peculiarly its own.

This great forest covers nearly 10,000 square miles, and stretches, with more or less extended interruptions, from beyond the Grand Cañon on the north and Bill Williams mountain on the west, southward to the great rim where the Colorado Plateau breaks down to the southern plains. It lies at an altitude of from five to seven thousand feet, with fir and spruce and beautiful groves of quaking asp intermingled at the higher levels, and a far-reaching fringe of cedar-covered mesas and hills dropping down to the lower plains and valleys. These cedar forests give much of the picturesque charm and beauty which characterizes the uplands of northern Arizona, and though they have no lumber value are a comfortable wood yard from which the Southwest may draw for generations.—*Out West*.

ECONOMIC GEOGRAPHY.—The study of Economic Geography in the schools is valuable as a means of education in proportion as it gives the pupil a basis for accurate facts and generalizations and develops the power of thinking out the true relations of the economic phenomena that will come to his attention every day of his business life. If this training is thorough and adequate he will be helped by it to look for and determine the causes and effects of facts and experiences that concern him personally, or influence the world's enterprises.

The most significant economic news of the day should therefore be used in the class room to develop the faculty and practice of reasoning out the real meaning of the facts presented. Statements worthy of credence in re-

liable newspapers and other publications may constantly serve to illustrate principles enunciated in the text-book.—*School Century*.

SUN-DRIED BRICKS.—The *adobe* is the salvation of the poor man in Mexico. Lumber is very expensive, stone or brick work is out of the question for him. On the high plateaus where he can neither gather the material for a house in an afternoon from friendly palm trees, and it would not be warm enough if he could, he must fall back upon mother earth for his shelter. The great *adobe* bricks are simply made. The clay is mixed with water and straw, usually the refuse from the stables, pressed into a square wooden frame on the ground to form it and then left to bake in the sun. It is really wonderful how long these bricks will stand the stress of sun and rain in a country where there are no severe frosts. And not alone does the poor man make use of this cheap building material. Many a pretentious wall, that is veneered with a respectable coating of plaster, and finished in imitation of brick or stone, eventually falls into decay and shows that within it has relied for strength and support upon *adobe*.—*Modern Mexico*.

NEWS ITEMS

The Ninth International Geographical Congress will be held at Geneva, Switzerland, from July 27 to August 6, 1908. A preliminary program will be issued by the committee of arrangements during the current year.

On July 13, at San Francisco, the Department of Elementary Education of the National Educational Association will hold a symposium devoted to the question of How to Teach Geography to Make Pupils Realize the Life Relations.

Papers will be presented on the Constant Attention to the Causal Notion in Class Room Work, by Richard E. Dodge, Professor of Geography, Teachers College; on Illustrative Excursions for "Field Sight"; and on the Emphasis of Commercial and Industrial Geography by Supt. W. N. Clifford, of Council Bluffs, Iowa.

The May number of the JOURNAL will include, in addition to the annual statement of summer school opportunities in geography and geology, a fairly complete selected list of apparatus and equipment available in geography teaching in Elementary and Normal Schools.

The concluding portions of the Oswego Normal School course in Geography will appear in May and June.

THE JOURNAL OF GEOGRAPHY

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No. 5

SUMMER SCHOOL COURSES IN GEOGRAPHY AND GEOLOGY, 1906

THE JOURNAL presents in this number a brief announcement of the courses in geography and geology to be given at colleges and normal schools during the coming summer, so far as the necessary information has been obtainable. For convenience of reference the grouping is by subjects.

ANTHROPO-GEOGRAPHY

University of Chicago, Chicago, Ill.

SOME Principles of Anthro-geography. Dr. Ellen C. Semple. Various aspects of the relation between Geography and History. Grouping of the land masses and its effect; the importance of geographic location; the ocean highway and coast peoples; rivers and the river-lowland habitat; island and island peoples; mountain barriers and their passes; mountain agriculture; the isolating effect of a mountain environment; life in deserts and steppes. June 16-July 26.

American History and Its Geographic Conditions. This course will be based on Dr. Semple's book of the same title, and will be supplemented by lectures. June 16-July 26.

Social Origins. Associate Professor W. I. Thomas. Association and culture in early times and tribal life. Early food conditions, migrations and race-crossings. Origins and relations of invention, trade, warfare, art, marriage. Class distinctions, the professional, legal, political, and ecclesiastical institutions. Ethnological reading. An introductory course. June 16-July 26.

GEOGRAPHY OF THE ATMOSPHERE

University of Chicago, Chicago, Ill.

Meteorology and Climatology. Mr. Harlan H. Barrows. The principles of Meteorology and their application to the climate of the United States. July 27-August 31.

Indiana State Normal School, Terre Haute, Ind.

Meteorology. A study of the atmosphere, weather and climate. Principles of weather forecasting and construction and use of weather maps. Laboratory work and instrumental observation. July 2-Aug. 10.

GEOGRAPHY OF THE LANDS

The University of Chicago, Chicago, Ill.

Continental Evolution. Professor R. D. Salisbury. The history of the physical development of the North American continent, and its resources. Primarily for teachers. June 16-July 26.

Physiography. Professor R. D. Salisbury. The Earth's features treated with especial reference to their origin and significance. Agents effecting changes in geographic features. Physiographic processes in operation. Genetic geography. June 16-July 26.

Field Study (Second Course). Professor Salisbury and Dr. Alden. Advanced field work, involving the systematic investigation of a formation or an area. A formal report, as nearly as practicable in conformity with the approved standards of official geological reports, is required. The work may be prosecuted during the months of June, July, August and September. In all cases, the arrangements will be individual, and the fields will be selected according to the needs of the applicants. Former glaciation in selected mountain regions of the west, and the drift formations of eastern Wisconsin, will be the special topics. Each period of four weeks of field work, with a satisfactory report thereon, gives a credit of 3M. Prerequisites: *Courses 8, 15 and 16.* July 27-Aug. 31.

Cornell University, Ithaca, N. Y.

Physical Geography. Professor Dryer. A lecture course upon modern physical geography, including the lands, the seas, and the atmosphere. The development and systematic classification of the leading physiographic features will form the basis of the course. Some of the topics discussed are: rivers, plains and plateaux, shore-lines, mountains, volcanoes, glaciers and the glacial period; the ocean, its composition, movements and work; the atmosphere, general circulation, cyclones and special storms. The lectures will be fully illustrated by lantern slides. Students electing this course are advised to take also two related courses. July 5-Aug. 15.

Eastern Illinois State Normal School, Charleston, Ill.

Physiography. Miss Annie L. Weller. A study of land forms and the processes of their development. Work with topographic maps and in the field. June 18-July 27.

Illinois State Normal University, Normal, Ill.

The Land, the Ocean, the Atmosphere, Mathematical Geography. Mr. Sutherland. The study of the land will be a treatment of the processes by which the surface of the land has been shaped, and of typical land forms with reference to their origin, history, and influence upon man. Local field trips will be a part of the class work. At least one all-day excursion will be arranged for, probably on the first or second Saturday of the term. An explanation of the tides and of the cause and influence of the ocean currents will be treated. The principles which control weather and climate will be developed and applied in continental study. Daily weather observations will be made and recorded by each student. These observations will be summarized at the close of the term. The mathematical geography as outlined in the state course of study will be treated.

Maps, charts, and other publications of state and federal government will be used. The use of such publications in the elementary school and the method of obtaining them will be considered. June 11-Aug. 31.

Indiana State Normal School, Terre Haute, Ind.

Physiography. The description and explanation of land forms. Examination of type forms in the field. Study of common minerals and rocks, and interpretation of maps in the laboratory. July 2-Aug. 10.

University of Missouri, Columbia, Mo.

Physiography. F. V. Emerson. A course of study in the principles of physiography as illustrated in the physical features of North America. The subject will be taken up from the point of view of the needs of the high school teacher of physiography, and will include the subject-matter as well as the equipment necessary for presenting it. The work will consist of laboratory and field work with occasional lectures and conferences.

Physical Geography. F. V. Emerson. This is a course of study in general physical geography, covering the ground of the average high grade textbook. It will be presented as a lecture, library, and laboratory course and may be taken as a preparation for more advanced geographic work or for teaching the subject in high schools.

Iowa State Normal School, Cedar Falls, Ia.

Physiography. This course is of advanced grade, giving the modern views in regard to geographical work. A study will be made of land forms, the changes they are undergoing and the agencies affecting these changes. Topographic maps will be used and frequent field trips taken. (Miss Knudsen.) June 10-July 21.

University of Minnesota, Minneapolis, Minn.

Physical Geography. Modern views on the common problems of physical geography will be presented. Subjects considered: phenomena of weather and climate; rock weathering, rivers and river valleys with their successive stages and their relation to agriculture and commerce; plains and plateaux,—origin and structural relations and their varied economic features. Also mountains and volcanoes,—mountain-building, crustal displacements, ore deposits; glaciers,—the glacial period and glacial results in Minnesota. June 19-July 31.

New York University, New York City

Physiography. Principal McFarlane. This course is designed to meet the needs of teachers and all others who wish to become more fully acquainted with the physical features of the lands. The lectures will touch upon: (a) The conditions of their origin: (b) The conditions of their development: (c) Their distribution. In the selection of examples especial attention is paid to our own country.

Ohio State University, Columbus, Ohio

Physical Geography. Professor Hubbard. A practical course in modern physical geography, covering the origin, development, and classification of land forms, with some work on the atmosphere and the ocean. Some of the topics treated are, rivers, valleys, plains, mountains, shore-lines, glaciers; the ocean and its work; the atmosphere, its circulation and special storms.

Regional Geography. Professor Hubbard. A course designed primarily for teachers of geography in the grades and in normal schools. The work is based upon a study of a good number of typical regions selected from the various continents and from them is extended to cover the world. The relation of man and the physical conditions will be the theme in each study. The purpose is to work out the life conditions in the several regions and to discover the relations of each region to others. June 25-Aug. 3.

Syracuse University, Syracuse, N. Y.

Physical Geography based on the Regent's Syllabus and adapted to the needs of teachers and entrance students. Dr. C. H. Richardson. July 5-Aug. 16.

Yale University, New Haven, Conn.

Physiography. Professor H. E. Gregory and Mr. I. Bowman. This course will include the principal topics of Physical Geography: The earth's shape, the oceans, the forms of the land, and weather and climate. The

part these factors have in systematic geography will be suggested from time to time.

Harvard University, Cambridge, Mass.

Physical Geography. G. R. Mansfield. Designed for teachers in secondary and normal schools. July 5-Aug. 15.

FIELD AND LABORATORY COURSES

University of Chicago, Chicago, Ill. (School of Education)

Field Geography. Associate Professor Zonia Baber. This course will furnish a basis for teaching geography and physiography. A trip will be made to Old Point Comfort, Va., with stops at points of special geographic or historic interest in the Allegheny plateau, Appalachian Mountains, Piedmont and Coastal plain. July 27-Aug. 31.

University of Chicago, Chicago, Ill.

Field and Laboratory Course. Mr. T. McD. Hills. Study of the geography and geology of Chicago and vicinity, and of relief, topographic, and geologic maps. The course will include two field trips (one on Saturday), and three laboratory exercises (or lectures), weekly. For teachers and for those who wish to learn methods of field work. Prerequisite: *Physiography*. First Term; 1:30-3:30.

NOTE.—Students taking this course should take no other afternoon course.

Cornell University, Ithaca, N. Y.

Laboratory Course in Physical Geography. Professor Dryer. This course includes both subject-matter and methods. Although the course is arranged primarily for teachers in high schools, yet it is so planned as to be of advantage to grade teachers who anticipate teaching geography in the high school. The laboratory equipment used in the course consists of numerous models, charts, and maps; much attention, however, is given to the possibilities open to teachers in schools having limited laboratory equipment. So far as possible the work offered will be arranged to meet the individual needs of teachers; where desired by a teacher, personal suggestions will be made regarding the local field work he may carry on with his classes. Among the specific topics treated are the following: the interpretation and use of topographic maps; study of topographic maps and models illustrating type land forms; the assembling and mounting of topographic sheets into useful type maps; physiographic influences; the use of photographs; common rocks; weather maps. July 5-Aug. 15.

Field Course in Physical Geography. Professor Dryer and Supervisor Whitbeck. One afternoon each week and two Saturday all-day excursions

are devoted to the study of physiographic phenomena in the field. In this field work a study is made of river valley forms, both young and mature; waterfalls; lakes; and typical glacial deposits, including moraines, drumlins, kames, eskers, and overwash plains. July 5-Aug. 15.

Michigan State Normal College, Ypsilanti, Mich.

Field Geography. Professor Jefferson. There are two aims in this work:—(1) to help teachers to recognize the geographic features of the landscape, and (2) to plan the use of these out-door forms in teaching with a text-book. June 25-Aug. 3.

GENERAL GEOGRAPHY

University of Chicago, Chicago, Ill.

Principles of Geography. Mr. Harlan H. Barrows. The meaning and scope of geography; the relation of geography to other subjects; the distribution and characteristics of land forms and climate; the distribution and utilization of natural resources, such as soils, minerals, plants and animals, with reference to man's distribution and industrial and social development; an application of the principles developed to the interpretation of type regions. July 27-Aug. 31.

Columbia University, New York City

General Geography. Miss Kirchwey. Lectures, discussions, and reference work with laboratory demonstrations. An introductory course in the elements of mathematical and physical geography designed to acquaint students with the modern point of view in geography, as well as to give them an understanding of the essential facts and principles of mathematical and physical geography necessary for a teacher of geography in the various grades of the elementary school.

The following subjects will indicate the general scope of the course: the shape, size and motions of the earth and their effects; the continents with special reference to the study of the principal land forms and the work of rivers; the oceans with emphasis on tides and ocean currents; the atmosphere in regard to the distribution of temperature, winds and rain over the world. Application will be made to North America throughout the work, so as to show the dependence of continental study upon these fundamental principles. July 5-Aug 16.

Cornell University, Ithaca, N. Y.

Geographic Influences and Relations. Supervisor Whitbeck. Lectures and studies designed to show the influence of physiographic and climatic conditions upon human activities: the influence of soil, coast-line, moun-

ains and valleys, plains and plateaux, gaps and passes, winds, rainfall, ocean currents; geographical causes leading to the location and growth of cities, the location and migration of industries; man's reaction upon his environment and his conquest of natural obstacles. July 5-Aug. 15.

Drake University, Des Moines, Ia.

General Geography. Prof. Clarence E. Nickle. Course in facts. A comprehensive knowledge of the principal points in the field of geography may be secured. Physical geography will be considered in the course of general geography. The end of this course shall be to supplement the general knowledge of teachers and to prepare them for state examinations.

Iowa State Normal School, Cedar Falls, Ia.

General Geography. (A)—Two weeks will be given to a review of physical geography. On this as a basis the United States will be studied, special attention being given to its physiographic divisions and the effect of the physical features on the industrial life in the different regions. A special study of Iowa will be made. (Miss Knudsen—IV., Miss Aitchison.)

Geography. (D)—The beginning work in general geography. This consists of elementary mathematical and physical geography, the work being taken up much more fully than in course A. Some field work will be done. (Miss Aitchison.)

Geography. (E)—The second half of general geography. This will consist of a more detailed study of the United States than is given in course A; also a study of Europe. Special attention will be given to physiographic features of the country and the industrial life of the people. Some time will be spent in studying Iowa as a type of the prairie state. (Miss Aitchison.) June 10-July 21.

University of Minnesota, Minneapolis, Minn.

Elementary Geography. Mr. Hall and Mr. Ball. This section will be adapted to the needs of those who wish to carry on a study of geography for general information and as a preparation for teaching grade geography. The subjects considered will be the physiographic features of the earth in their geographical bearing; products and their distribution, and a study of the principal industries of the globe. Field work will be a part of this course. Full course, two periods each day.

Advanced Geography. Mr. Hall and Mr. Ball. This section will contain those who have taught, or have studied it somewhat extensively. The subject-matter will comprise a more advanced study of the physical features, climate, animal and mineral resources of type regions, and their effect upon the development of these type regions along industrial and eco-

nomic lines. Field work is open to those registered in this course. Half course, one period each day. June 19-July 31.

University of Nebraska, Lincoln, Neb.

Physical Geography. Associate Professor Condra. A course for persons preparing for the state examinations, or to teach this subject or review-geography in the high school. It consists of lectures with lantern views, models, maps, specimens and the reflectoscope, and of laboratory experiments, library reading, and field excursions. Local excursions are made to points of interest near the University, and longer excursions on Saturday to Roca, Louisville and South Bend. The subjects treated are about the same as those outlined in any one of the modern physical geography texts. Approved methods of teaching the subject are emphasized. Laboratory fee, \$1.00. Five hours attendance. Laboratory, library and excursions. June 11-July 20.

New York University, New York City

General Geography. Principal McFarlane. This course is especially designed to meet the needs of those who wish a systematic and thorough review of general geography. It furnishes an excellent preparation for those who desire to teach geography in the grades.

The course includes a consideration of the elements of mathematical and physical geography, with especial emphasis upon climate, and shows how considerable is the influence which these exert in determining the character and distribution of life forms and the industrial and commercial activities of man.

Western State Normal School, Kalamazoo, Mich.

Physiography A. Mr. L. H. Wood. (1) Mathematical geography and meteorology. (2) Land forms and oceanography. Laboratory work one hour a day. Six weeks.

Physiography B. Rural School Course. Mr. L. H. Wood. (1) Mathematical Geography and Meteorology. Six weeks. (2) Land forms and oceanography. Six weeks. Laboratory work one hour a day.

Geography. General Principles. Mr. L. H. Wood. Prerequisite: Courses in physiography or the regular high school course in physical geography.

State Normal School, Winona, Minn.

General Geography. Professor E. M. Lehnerts. Course I. (a) The fundamental facts and principles of mathematical and physical geography and their relation to the distribution of life and industries of man are

considered, the work being made as concrete as possible by means of apparatus, problems, experiments, and out-of-door observations. (B) A study is made of the western hemisphere, with special emphasis on the geography of the United States. Twice daily.

Course II. The countries of the eastern hemisphere are studied in detail, and their commercial relations with the United States are given special attention. For high school graduates this course will be supplemented by some study of methods of teaching the subject in the grades. Twice daily. June 19-Aug. 1.

Physical Geography. Professor E. M. Lehnerts. The course includes: 1. Land forms, and the agents and processes which have produced them; the birth, growth, and decay of river valleys, mountains, plains, coast-lines, and other geographic forms. 2. The properties, movements, and work of the atmosphere and of the ocean; climate and weather; scientific weather forecasting. 3. Principles underlying the distribution of plant and animal life; the influence of the physical environment on man. Twice daily. June 19-Aug. 1.

University of Wisconsin, Madison, Wis.

General Physiography. Professor A. P. Brigham. Five hours a week for six weeks. Lectures, collateral reading and excursions.

INDUSTRIAL AND COMMERCIAL GEOGRAPHY

University of Chicago, Chicago, Ill.

Industrial History of the United States. Mr. Robert Morris. An inquiry into the causes of the industrial expansion of the country, with some reference to European conditions. The class will visit a number of industrial establishments in and near Chicago.

Illinois State Normal University, Normal, Ill.

Commercial Geography. Mr. Ridgley. The world in its relation to man as a producer and trader. Thorough study will be made of some of the great industries. A number of these industries will be illustrated by series of museum specimens. Excursions will be made to local industries. These studies will indicate method of treatment of similar topics in both grammar and high school grades. More time will be given to the United States than to any other country, but the leading countries of each continent will be treated. Much library reading will be required. Relief maps will be made.

This course will be especially helpful to teachers who feel the need of a wider knowledge of the subject-matter of geography. June 11-Aug. 31.

Iowa State Normal School, Cedar Falls, Ia.

Commercial Geography. Miss Aitchison. A study of the natural conditions affecting commerce, routes and means of transportation and the natural resources and industries of the United States. A comparative study will be made of the resources and industries of foreign countries. June 10-July 21.

University of Minnesota, Minneapolis, Minn.

Industrial Geography. A course in the world's industries, particularly as exemplified in North America. Climate and topography in their influence upon human migrations and activities will be first emphasized. The soil in its physical and chemical composition and origin will then be discussed and its relations to forests, prairies and plains will be considered. The food supply of the world will be discussed; the origin of the various cereals and other foods will be pointed out and an historical sketch giving their growth in favor. The rock and mineral products of the earth and their utilization in the construction of homes, public buildings and in engineering enterprises and their adaptation to the luxuries of living will be touched upon. Trade routes marketing the products of labor and commercial activities as related to latitude, topography, proximity to the sea, and industrial communities will receive attention. June 19-July 31.

University of Nebraska, Lincoln, Neb.

Industrial Geography. Associate Professor Condra. There is an increasing demand for teachers of Industrial and Commercial Geography in the high schools. This course is planned to prepare teachers for such instruction and to cover as much of the subject as possible in six weeks. It is to treat the principal mineral, plant, and animal industries of the United States. Commercial movements and the commercial relations of products also will follow. Five hours attendance. Lectures and library; excursions to the principal industries of Lincoln. June 11-July 20.

Yale University, New Haven, Conn.

Commercial Geography. Professor A. G. Keller, and Messrs. Bishop and Bowman. This course is a general study of the relation of man to his environment. Climate, soil, topography, and other physiographic elements will be treated as conditioning factors of the production and distribution of goods destined for the satisfaction of human wants. Distribution of the materials of commerce, foods (and their physiological values), clothing, building materials, etc. Conditions of transportation: natural water-routes, winds, ocean currents, harbors. Complementary trade-areas, trade-routes and their historical importance. Direct influence on man, as a pro-

ducer and consumer, of the natural environment: climate (acclimatization), topography, flora and fauna, etc. Race characters and race distribution: the geography of disease, etc.

GEOGRAPHY OF PLANTS AND ANIMALS

University of Chicago, Chicago, Ill.

Elementary Ecology. Dr. Henry C. Cowles. Plants in relation to their environment. Field work in the greenhouses, parks, and vacant grounds near the University, with occasional laboratory exercises and field trips to the country. June 16-July 26.

Ohio State University, Columbus, Ohio

Plant Culture and Animal Study. Professor Burkett. A study of how plants feed and grow, supplemented with simple experiments, all to be prepared by teachers as a part of regular instruction. The many sides of plant culture will be considered so that the teacher can interest the pupils in numerous ways, all having a practical application to agriculture.

The same plan will be followed in studying animal life. The soil, the plant, and the animal have a direct relation to each other, deserving the most careful thought and study. Since children love animals, they can easily be taught to observe and study them, and thus lay the foundation for larger study and the acquisition of most useful knowledge. The teacher will be shown ways and methods of preparing simple exercises in the school room and school yard that will not only be of great practical value, but will also interest and delight the pupils to the fullest degree. June 25-Aug. 3.

Western State Normal School, Kalamazoo, Mich.

Plant and Animal Geography. Mr. L. H. Wood. In this course the work is intended to give students a foundation for the study of economic and industrial geography so far as they depend upon the distribution of these organisms or the products of value derived from them.

GEOGRAPHY OF CONTINENTS AND COUNTRIES

Eastern Illinois State Normal School, Charleston, Ill.

The Geography of Eurasia. Miss A. L. Weller. Its physiographic regions, climatic conditions, resources and industries, with emphasis placed upon surface conditions as influencing human institutions. June 18-July 27.

Illinois State Normal University, Normal, Ill.

A Study of the United States. Mr. Sutherland. An introductory view of the continent, followed by a careful study of the United States by physiographic and industrial regions, and summarized by a review show-

ing interrelations of the different regions and the relation of the whole to the outside world. Much library reading will be required. Relief maps of North America and the United States will be made.

This course is of especial value to teachers of the grammar grades.

A Study of Europe, and Mathematical Geography. Mr. Wetzel. This course includes a study of the continent as a whole to determine its physiography and natural resources; a careful study of the physical and human geography of the more important countries; an examination of the most interesting phases of life in the minor ones; and a summary of the whole from the point of view of the industries.

Observational work and the graphic representation of the facts presented will be the special features of the mathematical geography.

Michigan State Normal College, Ypsilanti, Mich.

General Geography of the Continents. Professor Jefferson. A course of lectures will take up the physical features that seem to exercise most evident control on the distribution of man, and the social and political reactions of men to the control, with especial reference to the geography of Michigan.

Geography of American History. Professor Jefferson. The course will seek to show the part that geography has played in making our country what it is, that teachers may make the action of history more vivid by better realization of the scenes in which it has occurred. Brigham's *Geographic Influences in American History* will be used in part as a text, and the work illustrated by the college collection of maps and models. Students will be shown how to prepare wall maps and diagrams for class use. June 25-Aug. 3.

Indiana State Normal School, Terre Haute, Ind.

Geography of the United States. A study of the physiographic regions of the United States in relation to economic products and human occupation. Manufactures, transportation and commerce. Source, movement and growth of population. Location and development of cities. Map drawing on mathematical projections. A well equipped laboratory and an ample and carefully selected list of reference books facilitate the work in this department.

The summer term furnishes a favorable opportunity for city grade and high school teachers who have but a limited vacation period at their disposal to study this science in relation to its recent material and pedagogical progress. July 2-Aug. 10.

Northern Illinois State Normal School, DeKalb, Ill.

Geography. Miss Knudsen. This course is intended for graduates of country schools. It will discuss the general relief forms of the continents, comparisons of the continents, political divisions, commercial relations, and will include map drawing and modeling. June 24-Aug. 2.

University of Nebraska, Lincoln, Neb.

Geography of Nebraska and the Great Plains. Associate Professor Condra. A careful survey of the geography of Nebraska and a more general treatment of the bordering states. The course is suited to students both of geography and of agriculture. The aim is to supply information which is not accessible to many teachers. Topographic maps, U. S. Geological Survey bulletins, folios, water supply papers, state reports and the instructor's field notes serve as a basis of library reading. The subjects are as follows: surface appearance, structure, weather, climate, drainage, principal rivers and valleys, ground water, topographic regions, soil areas, mineral resources, water resources, agricultural resources, reclamation schemes, settlement and development, and the cities and towns. The lectures are illustrated by a large number of lantern slides and reflectoscope views. It will be possible for each person taking this course to work up an outline of the geography of his home region. Laboratory fee, \$1.00. Five hours attendance. Laboratory, library and excursions. June 11-July 20.

Western State Normal School, Kalamazoo, Mich.

Geography of the Western Hemisphere, North and South America. From these continents typical regions will be selected to illustrate the principles of geography.

University of Wisconsin, Madison, Wis.

Physiography of the United States. Professor A. P. Brigham. Two hours a week for six weeks.

Lectures, collateral reading and excursions.

THE TEACHING OF GEOGRAPHY

University of Chicago, Chicago, Ill. (School of Education)

The Teaching of Geography in the Grammar Grades. Associate Professor Zonia Baber. Continental Study. Eurasia. June 16-July 26.

The Teaching of Geography in the Primary Grades. Associate Professor Zonia Baber. A study of type topographies, climates, and life through human industries. June 16-July 26.

Geographic Drawing and Chalk-Modeling. Mr. Georg Thorne-Thomsen. Blackboard sketching of typical surface features: plains, valleys,

mountains, glaciers, canyons, shore-features, etc.; cross-sections and pictorial representations of large sections of continents, as plateaux, river basins, and mountain systems; chalk-modeled relief maps. The work will be done on paper as well as on the blackboard.

First Term; 11:30. Repeated; 1:30.

Columbia University, New York City

The Teaching of Geography. Lectures, conferences and library work. Miss Kirchwey. A consideration of the course of study in geography for elementary schools and of the general principles underlying good geography teaching. Work will be made as practical as possible, with much discussion of the best method of presenting to children the difficult problems met in the various grades. Each student will outline some special topics, adapted to the grade or grades of interest to him. Class criticism and discussion of these topics, outlined as lesson plans suited to certain grades. July 5-Aug. 15.

Cornell University, Ithaca, New York

Home Geography. Mr. Farnham. Conversations and studies designed to show what the elements of home geography are; when and how they may be presented. To this end excursions will be made to fields, shops, and local industries. How such excursions may be made with classes of children will be discussed. The value of pictorial teaching will be illustrated. Occupations modified by seasonal weather will be noted. The relation of home geography to the geography of regions beyond the pupils' horizon will be considered. July 5-Aug. 15.

The World as a Whole. Mr. Farnham. A series of globe lessons introduced by a consideration of well-known and important commodities used to meet human needs. These lessons illustrate climatic influence on plants, animals and human activities. The use of raw material and manufactured products to Home Geography and to later studies will be traced. July 5-Aug. 15.

Studies of North America. Mr. Farnham. The seven great human industries. Subject-matter, method of treatment, use of specimens, pictorial illustrations, maps, and use of text-book discussed and illustrated. Ideas gained from Home Geography and from lessons on the world as a whole furnish a basis for the first treatment of North America.

The movement from North America to the other continents is discussed at length. In combination with the previous courses this will give a full survey of the whole elementary course in geography.

Aims and Problems in Geography. Supervisor Whitbeck. Designed

more particularly for grammar school teachers. The course consists of lectures, discussions and exercises dealing with the actual problems of the class room. Some of the topics treated are: the chief aims in teaching geography; the relative value of different kinds of geographical knowledge; methods of conducting the recitation; the proper use of the text-book; the use and misuse of supplementary books; map modeling, map drawing, and the use of outline maps; use of pictures; field and factory trips; simple laboratory exercises; simple methods of teaching the earth's movements, the tides, etc.

Round Table Conference in Geography. There will be several evening conferences for instructors and students in geography, at which discussions of important general topics in connection with geography will take place. Some topics discussed in previous years were Nature and Scope of Geography, Principles Determining the Course of Study in Geography, Excursions and Laboratory Work in Geography, Sources of Geographic Knowledge.

Attendance on this course is purely voluntary and cannot be counted for University credit; but such free interchange of views among teachers and students is expected to throw much light on problems of teaching and on working methods. July 5-Aug. 15.

Drake University, Des Moines, Iowa

Education. Professor C. E. Nickle. In the course of methods the correlations of geography with other subjects will be discussed. How to teach, what to teach, when to teach and where to teach particular subjects will be emphasized especially.

Excursions to representative industries of Des Moines will be taken and field lessons will be given. The region of Des Moines is remarkably adapted to the study of coal beds, glacial deposits, river valleys and flood plains. Lectures will be illustrated with a stereopticon. Laboratory work will be offered.

Eastern Illinois State Normal School, Charleston, Ill.

Illinois State Course of Study in Geography. Miss A. L. Weller. Lectures daily based upon the outline of material in the State Course. June 18-July 27.

Illinois State Normal University, Normal, Ill.

Method in Geography. Mr. Ridgley. This course includes a study of material for the grades and its logical organization. Home geography, field work, observational work, and type studies from various continents selected from the work of different grades will be studied from the teacher's

point of view. Field lessons will be a part of the class work. Much library reading will be required. Instruction will be given in the selection and preparation of pictures and museum specimens for school use. Relief maps will be constructed by each student.

This course is especially designed for teachers of primary and intermediate grades.

Geographical Type Studies. Mr. Wetzel. A detailed study of typical industrial, desert, and scenic centers, and a general view of a continent. Comparison of each type-area, with other similar areas. The purpose is to find out: (a) The control of man by conditions; (b) man's modifications of his physical environment; (c) the choice of geographical material and the order of its presentation as controlled by the interest of the child, his power, the locality, and the educational value of the subject-matter. June 11-Aug. 31.

Michigan State Normal College, Ypsilanti, Mich.

Teachers' Geography. Mr. Davis. This course is designed to prepare students for teaching geography in the public schools, as far as its subject-matter is concerned. It deals with the nature and use of maps, and the study of teaching of weather and climate. June 25-Aug. 3.

Northern Illinois State Normal School, DeKalb, Ill.

Geography. Miss Grace Knudsen. The chief aim in these courses in geography is to present geographical material in an organized form. The dependence of human institutions upon the physical condition of the earth, its surface topography and constitution, is the principle upon which the organization is based. The further aim in these courses is to present, first, the principles that govern the selection and arrangement of the material for the grades; second, the use of helpful devices such as illustrative drawing, chalk modeling, pictures, maps and field excursions; third, the use of the text-book and the library.

1. Home Geography; a brief study of the common physiographic features and their relation to the life of man.
2. The earth as a whole; motions of the earth and their effects; motions of air and water.
3. Selected type-studies. June 24-Aug. 2.

New York University, New York City

Method in Geography. Principal McFarlane. In this course a special effort will be made to prepare teachers to handle work in Geography for the elementary grades as outlined in the Elementary Syllabus recently issued by the New York State Education Department. Aside from this,

however, the course will include lectures on the method and material of Geography and its place in the school curriculum.

GEOLOGY

University of Chicago, Chicago, Ill.

Field Geology, First Course (outside of Chicago). Dr. W. W. Atwood. This course is intended to form an introduction to the more specialized professional courses that follow, and to furnish a basis for the teaching of Geography, Physiography, and elementary Geology. It involves training in stratigraphic, glacial, and other field determinations, together with mapping, sketching, and technical description. The field is the vicinity of Devil's Lake and the Dells of the Wisconsin, in Wisconsin. Four weeks will be spent in the field, commencing June 18. The preparation of a report will complete the course.

Harvard University, Cambridge, Mass.

Geology. Mr. J. W. Eggleston. An elementary lecture, laboratory and field course in Dynamic and Structural Geology. July 5-Aug. 15.

State University of Iowa, Iowa City, Iowa

Geographic Geology. Professor Calvin. This is a course intended to meet the needs of those who expect to teach physical geography and geology in high schools. It will include a study of the origin of the physical features of the earth, the agencies of geographical development and change, and an outline of historical geology. Large use will be made of illustrative materials, including rocks and mineral specimens, models, maps, photographs and lantern slides. Field excursions on Saturdays are included in the course. June 18-July 28.

Geology of Iowa. Professor Calvin. A course in the geology of Iowa is offered to students who are registered for course I, or who have previously had an amount of work in geology equivalent to course I. It is the purpose of this course to pay especial attention to the geological structure and history of our own state, the areal distribution of our geological formations, their characteristics and uses, and the conditions under which they were deposited. The economic minerals of Iowa will be considered, together with the geographical and geological positions in which they occur. The rocks, minerals and typical fossils will be illustrated by specimens selected from the geological collections of the University, and photographs and lantern slides will be made to aid in the presentation of the subject. The publications of the Iowa Geological Survey will be used for reference, and the work of the lecture room and laboratory will be supplemented by excursions in the field. June 18-July 28.

Michigan State Normal College, Ypsilanti, Mich.

Minerals and Rocks. Professor Sherzer. This is a practical study of the more common minerals and rocks, particularly those of economic importance. Bulk material is furnished to the teacher for study and he is assisted in making a small private collection. Blow-pipe methods and simple chemical manipulation will be acquired. Field trips will be made as often as needed for the collection of local material and the week end excursions will afford opportunity for collecting from more distant localities. No previous knowledge of geology or chemistry is presupposed.

Physiographic Geology. Professor Sherzer. An elementary study of those geological agencies which are now at work in modifying the surface of the earth, in order that the pupil may understand how these agencies have operated in past time. The course will cover the mechanical and chemical action of the atmosphere, the geological effects of ice and running water, the various organic agencies in our ponds, lakes and seas, and the phenomena due to the internal heat of the earth. The course will consist of library work and lectures, illustrated with photographs, models, specimens and lantern slides. June 25-Aug. 3.

The University of Minnesota, Minneapolis, Minn.

The Elements of Geology. This subject will be treated under the following subdivisions:

- a. Geodynamics—air, water and vulcanism as sources of energy, with a discussion of the phenomena traced to them; the destructive and reconstructive effects of these forces will be considered.
- b. The principal minerals will be described, (1) rock-forming, (2) economic interests in their relation to industries.
- c. The architecture of the earth, the aggregation of minerals into rocks by the various processes of rock building; the aggregation of minerals into rocks and the principles of metamorphism.
- d. Historical geology—the facts and phenomena of living beings and the results of their existence on the earth. June 19-July 31.

Syracuse University, Syracuse, N. Y.

Dynamical and Structural Geology. Dr. C. H. Richardson. This course embodies the principles of general geology and is designed for those wishing to make college credit and for teachers in the secondary schools desiring a broader knowledge of the subject, with training in field and laboratory work. July 5-Aug. 16.

THE GEOGRAPHY COURSE IN THE OSWEGO STATE NORMAL AND TRAINING SCHOOL

BY AMOS W. FARSHAM
Oswego, N. Y.

PART IV

THE WORK OF THE GRADES (Continued)

Fifth Grade: North America and Eurasia (first treatment)

BY "first treatment" we mean the study of human industries as determined by earth environment. Children of this grade are more familiar with human industries than with related earth conditions. They often play a minor part in such industries. Our great industries are effects, each resulting from certain earth causes. Young children are more interested in what has happened than in what caused it to happen. Hence in the first study of North America the human element is emphasized, but the earth element and their inter-relations are not overlooked.

NORTH AMERICA

After lessons on the world as a whole, a systematic study of the continents is begun, taking the continent of North America first. This is our home continent. It is first located on a large globe, then on Mercator's Map of the World; afterward a map of North America, in relief, is placed before the class. Lake Ontario is found, the Oswego River is noted, and Oswego is located. The position of Alaska is reviewed, also its direction and distance (in units of time) from Oswego, its climate is recalled and climatic effects on life are stated. (That Alaska is under our flag is not overlooked.) A similar review of Mexico is had. Children note the direction of Mexico and Alaska from each other. Compare their climates, also compare each with the climate of Oswego. Children recall what useful articles we get from each of these regions, and state why we cannot provide ourselves with these commodities within the limits of our own environment.

We now study that part of North America that lies between Alaska and Mexico, that part that takes in our own home (Oswego). The remaining political divisions, the United States, Canada, and incidentally the Central American republics, are located and their boundaries are traced.

Of all the great industries agriculture is one of the oldest, the most important, the most honored. It supplies us with our leading food products, as well as with the most important materials for our clothing. Every gar-

den plot, no matter how small, may illustrate the necessary conditions for both possible and successful cultivation of plants. Hence:—

A. Agriculture.

I. Wheat culture.

Illustrative material: Specimens of wheat bread, brown bread, crackers, shredded wheat biscuit, macaroni; white flour, whole wheat flour; wheat threshed and unthreshed. Picture of a field of wheat.

Note.—More than one-third of the earth's inhabitants are wheat-bread eaters.

1. Location of wheat regions of North America. Wheat thrives best between the parallels of 25° and 55° .
 - a. Valley of the Red River of the North.
(Minnesota, North Dakota, Manitoba.)
 - b. The Central States.
(Ohio, South Dakota, Kansas, Indiana, Nebraska, Missouri, Iowa, Michigan, Illinois, Oklahoma, Kentucky, Texas, Tennessee, Wisconsin.)
 - c. The Atlantic States.
(Pennsylvania, New York, Maryland, Virginia.)
 - d. The Pacific States.
(California, Washington, Oregon.)
 - e. Canadian Wheat Region.
(From Lake Winnipeg to the Rocky Mountains.)

Which is the largest of these wheat regions? Which is the smallest? Which regions are in our own country? Which are in Canada? Which are nearest to Alaska? Which are nearest to Mexico? Which is nearest to the sea? Which is farthest from the sea?

Note.—In each group the states are named according to rank in wheat production as reported in the Twelfth Census. The seven leading states are Minnesota, North Dakota, Ohio, South Dakota, Kansas, California, Indiana. Indiana produced 35,000,000 bushels, Minnesota produced 95,000,000 bushels. In 1900 the United States produced 500,000,000 bushels of wheat, and therefore led the wheat producing countries of the world.

2. Conditions favorable for wheat culture.

- a. Slope; long, gentle, and generally southward. Note effect on drainage, insolation, and ease of cultivation.
 - b. Soil; fine, deep, rich in plant food.
 - c. Temperature; the temperature of the different wheat regions varies, hence different kinds of wheat are sown in them; spring wheat and winter wheat and different varieties of each.
 - d. Rainfall; moisture equivalent to an annual rainfall of twenty inches is necessary for wheat growing. When this amount is not supplied naturally, farmers resort to irrigation. Show pictures of irrigating ditches and reservoirs, and of irrigated fields, found in geographies and government reports.
Read, *A Visit to a Great Wheat Farm*, in Carpenter's *North America*.
3. Great Wheat Centers. Reasons for their existence; also reasons for the location of the following named wheat centers: Minneapolis, St. Paul, Winnipeg, Montreal, Quebec, Chicago, Milwaukee, St. Louis, San Francisco, Portland (Ore.).
- Children locate all wheat centers on maps in their geographies, stating: Minneapolis is a city in the State of Minnesota, on the Mississippi River, etc.
- Study Minneapolis and St. Paul in detail, compare others with them.
- Minneapolis is a railroad center in the midst of the greatest of the wheat regions, at the head of navigation of the Mississippi River, on the falls of St. Anthony which afford great water-power. The Pillsbury Mills of Minneapolis have a capacity of 60,000 barrels of flour a week. Note this reading, "Pillsbury's Best," on sacks of flour in your grocer's store. If your mother uses this brand of flour, ask her to save for you the leaflet that she finds in the mouth of the next sack. See what you can learn from it about flour making in the Pillsbury Mills.
4. Ports from which our wheat is shipped. New York (the leading export city), New Orleans, Galveston, Baltimore, Philadelphia, San Francisco, Tacoma, Portland (Ore.).
- In what state and on what water is each export city?
5. Transportation routes, both water and rail, from wheat

centers to export cities. Note that much wheat is shipped in the form of flour.

Children trace all routes with care, naming in order all connecting waters and all trunk lines of railroads.

6. Foreign ports to which our wheat is shipped.

Liverpool, Hamburg, Christiania, Havre, Havana, Yokohama, Shanghai.

In what country and on what water is each named foreign port?

From what region do we send wheat to Yokohama and Shanghai?

Trace ocean routes from our wheat export cities to the foreign ports where wheat is sold. Why are these foreign countries dependent upon our wheat crop? Reasons for this dependence, also for our ability to supply them.

What does each of these countries furnish us in return?

Why do we not produce these commodities ourselves?

Note density of population of wheat region and reasons for same.

II. Corn Culture.

Illustrative material: Specimens of corn meal and corn starch; corn shelled and in the ear, husked and on the stalk. Picture of a field of corn.

Note.—Next to wheat, corn is the chief bread-stuff on the American continent. Corn is the staple grain of Mexico. The "tortilla," the national bread of the Mexicans, is a corn-meal wafer baked on hot slabs of stone.

I. Location of corn regions of North America.

Corn thrives best in regions having long summers and warm nights.

a. The Central States.

(Illinois, Iowa, Kansas, Nebraska, Missouri, Indiana, Ohio, Kentucky, Tennessee, Wisconsin, Minnesota, Michigan, Arkansas, Oklahoma, South Dakota, Indian Territory.)

b. The Gulf States.

(Texas, Mississippi, Alabama.)

c. The Atlantic States.

(Pennsylvania, Virginia, North Carolina, Georgia, New York, Maryland, South Carolina.)

Which is the largest of these corn regions? Which is the smallest? Which is the farthest from the sea? Which is nearest to the sea?

Note.—In each group the states are named in the order of importance as corn states. The seven leading states are the first seven named in the Central States. In 1900 Ohio produced nearly 155,000,000 bushels, Illinois produced almost 400,000,000 bushels.

In 1898 the United States produced more than 2,100,000,000 bushels of corn, being four-fifths of the world's crop. Although Austria-Hungary holds second place among the corn producing countries of the world, she produced only a little over 100,000,000 bushels.

2. Conditions favorable for corn culture.
 - a. Slope, similar to that for wheat.
 - b. Soil, as for wheat.
 - c. Temperature, higher than for wheat.
 - d. Rainfall, greater than for wheat, and yet the growing crop is easily injured by too much rain.

Note.—By far the greater part of our corn crop is consumed where it is grown, being used to fatten hogs and cattle.

3. Slaughtering and meat-packing regions.
 - a. Central States.
(Illinois, Kansas, Nebraska, Indiana, Missouri, Iowa, Ohio, Wisconsin.)
 - b. Atlantic States.
(New York, Massachusetts, Pennsylvania, New Jersey, Maryland.)
 - c. Pacific States.
(California.)

What relations do these meat-packing regions bear to the corn regions of our country? Which is the largest of the meat-packing regions? Which is the smallest? Which region is most densely settled?

Note.—In each group the states are named in the order of importance as meat-packing states. The seven leading states are Illinois, Kansas, Nebraska, New York, Indiana, Missouri, Massachusetts.

In 1900 the value of this industry in Illinois alone was nearly \$275,000,000; in Maryland about \$10,000,000. Read, Indian Corn and the Corn Belt, in Carpenter's *North America*.

4. Slaughtering and meat-packing centers.

Chicago, Kansas City (Kans.), South Omaha, New York, St. Joseph (Mo.), East St. Louis (Ill.), Indianapolis, Somerville (Mass.), Milwaukee, St. Louis, Philadelphia, Buffalo, Cincinnati.

In 1900 Chicago's meat-packing industry exceeded \$255,000,000; Cincinnati's about \$10,000,000.—*Twelfth Census*.

A great quantity of the meat-packing products of these centers is consumed in our own country.

Ask your butcher from what local "cooler" he buys his meats. Find out what packing house supplies the local "cooler," and where this packing house has its headquarters. It is probable that this packing house indirectly supplies your butcher with nearly every kind of meat (fresh, salted, canned, etc.) found in his market, poultry excepted.

There are four coolers in Oswego representing respectively Armour and Co., Swift and Co., Schwartzschild, Sulzberger and Co., and the Omaha Packing Company. The first three have their central plants in Chicago; the last one has its central plant in South Omaha.

An excursion to a local cooler.

There is practically no waste in a packing house. Even the sweepings are utilized. There is a special use and commercial value placed on hair, horns, hides, hoofs, bones, blood, bladders, intestines and their contents, as well as flesh, fat, and other portions used for food.

The market value of a pound of corn is about one-third of a cent; converted into pork or beef, however, it is worth five or six times as much.

By feeding the corn to stock, therefore, a farmer may turn an unmarketable product into one for which there is a steady demand.—Redway's *Commercial Geography*.

It must be said that a very large part of the corn crop is used annually in the manufacture of distilled liquor.

5. Ports from which our meats are shipped.

New York, Boston, Philadelphia.

In what state and on what water is each export city?

6. Transportation routes, both water and rail, from meat-packing centers to export cities.

Children required to trace all routes intelligently.

7. Foreign ports to which our meats are shipped.

Liverpool, Hamburg, Antwerp, Trieste.

In what country and on what water is each named foreign port? Trace ocean routes from our meat export cities to the foreign ports where our meats are sold. Why are these countries compelled to buy meats, and why are we able to sell to them? What do we get in exchange for our meats, and why do we not supply ourselves with these commodities?

Of the corn and wheat regions, which extends farthest north? which farthest south? Which states rank both as corn and wheat states?

Review wheat and corn culture in the lecture-room with lantern slides.

III. Cotton culture.

Illustrative material: Specimens of cotton in the boll; cotton seeds, pictures of the cotton plant and of a cotton plantation; samples of cotton goods, colored and uncolored, varying greatly in fineness and weight; samples of cotton lace and thread.

1. Location of the cotton regions of North America (where the crop exceeds home consumption).

Cotton is grown in the United States south of the thirty-seventh parallel and east of the hundredth meridian.

Locate this region on the map.

- a. The Gulf States.

Texas, Mississippi, Alabama, Louisiana, Florida.

- b. The South Central States.

Arkansas, Tennessee, Missouri.

- c. The South Atlantic States.

Georgia, South Carolina, North Carolina, Virginia.

Where are the cotton regions with regard to the corn regions? With regard to the wheat regions? Compare the area of the cotton region with that of the corn region; with that of the wheat region.

2. Conditions favorable for cotton culture.

- a. Slope; long, gentle, southward.
- b. Soil; fine, deep (river flood-plains).
- c. Temperature; long season of warm days in the sub-tropics. Cotton also thrives best near the coast.
- d. Rainfall; a good degree of moisture is needed.

3. Great cotton centers. Reasons for their existence, also reasons for the location of the following named cotton centers: Galveston, Mobile, New Orleans, Savannah, Charleston.

Children locate all cotton centers on maps in their geographies, stating, "Galveston is a city in the State of Texas, on the Gulf of Mexico," etc.

In 1899 our cotton crop was equivalent to 9,434,345 500-pound bales.

The five leading states were Texas, Mississippi, Georgia, Alabama, and South Carolina. Texas produced 2,600,000 five-hundred-pound bales; South Carolina produced 850,000 five-hundred-pound bales. Our best cotton, known as sea-island cotton, is raised on the islands off the Carolina coast.

4. Ports from which our cotton is shipped.
(From each named cotton center. New Orleans is the largest cotton market of the United States.)
5. Foreign ports to which our cotton is sent.

Manchester, (England buys one-third of our annual cotton crop), Hamburg, Cologne, and Christiania.

Trace ocean routes from our cotton-export cities to the foreign ports where our cotton is sold.

Why are these foreign countries dependent upon our cotton crop?

Reasons for this dependence and also for our ability to supply them.

What does each of these countries furnish us in return?

Why do we not produce these commodities ourselves?

How does the population of the cotton regions compare in density with the population of the corn regions? Account for the difference.

Review cotton culture in lecture-room with lantern slides.

B. Grazing.

The highest civilization is attainable only by a combination of agriculture and stock-raising.—*Dryer*.

I. Neat cattle.

1. Location of states whose farms and ranges support one million or more of neat cattle.

a. The Central States.

Texas, Iowa, Kansas, Nebraska, Illinois, Missouri, Wisconsin, Ohio, Minnesota, Oklahoma, Indiana, South Dakota, Indian Territory, Michigan, Kentucky.

b. The Atlantic States.

New York, Pennsylvania.

c. Rocky Mountain States.

Colorado, New Mexico, Montana.

d. Pacific States.

California.

e. Southern Canada.

Which of these regions is the largest? The smallest? Which states are included in the corn regions? In the meat-packing regions?

The seven states that lead in the number of neat cattle on farms and ranges are Texas, Iowa, Kansas, Nebraska, Illinois, Missouri, New York. New York has over two and one-half millions (a large number), but Texas has nearly nine and one-half millions. In New York and some other states the cattle are raised chiefly for dairy products; in Texas and some other states they are raised chiefly for meat products.

The five states leading in value of dairy products are New York, Wisconsin, Iowa, Illinois, Pennsylvania.

In 1900 Pennsylvania's dairy products exceeded in value \$10,250,000; New York's dairy products exceeded \$26,500,500.

What conditions enable New York to lead in this industry? Where is this enormous yield of dairy products consumed?

2. Conditions favorable for cattle ranges.

a. Natural pasturage (bunch grass).

b. Water supply.

c. Mild winters with little or no snowfall.

C. Lumbering.

Outside the food-stuffs, probably no other material is more generally used by human beings than the products of the forests. More people

are sheltered by wooden dwellings than by those of brick or stone, and more people are warmed by wood fires than by coal. Even in steam-making a considerable power is still produced by the use of wood for fuel.—*Redway*.

Illustrative material: Specimens of different kinds of woods used in house building and furniture making. It is well to have specimens of equal dimensions, then pupils readily note differences in weight, hence in density (hardness). Call attention to the color and graining. Note the fitness of the different woods, each for its particular use.

I. Location of lumber regions.

1. Canada. South of the fiftieth parallel.
2. Central and Atlantic States. North of the thirtieth parallel and east of the ninety-fifth meridian.
3. Pacific States.

In the year 1900 the value of the lumber and timber products exceeded \$20,000,000 in each of the following named states: Wisconsin, Michigan, Minnesota, Pennsylvania, Washington, Arkansas, Ohio, and Indiana. Wisconsin's product somewhat exceeded fifty-seven and one-half millions.

Canada's annual product reaches \$80,000,000.

What kind of lumber is largely produced in each of the eight leading states? What kind in Canada? What is the principal use of each kind?

How are the indeciduous members of the pine family fitted for the cold and snows of their habitat?

What kind of lumber is used at the Diamond Match Factory? At the Box Shop? Why best adapted for these purposes? Where produced?

What kinds of lumber are used in our manual training shops? What things are made there of pine? Oak? Redwood? Whitewood? Source of each.

The lumbering industry reviewed in lecture-room with lantern slides.

D. Mining.

- I. Coal, iron, copper, gold, silver, granite, sandstone, limestone, marble, clay, slate, petroleum.

The work is elaborated and outlined similar to the work on each of the preceding industries.

E. Fishing.

Cod, banks of Newfoundland; mackerel, near the shores of eastern Canada and the north Atlantic States; oyster, Long Island Sound and Chesapeake Bay; salmon, Columbia River and Yukon River; seal, Pribilof Islands in Bering Sea; whale, off the shores of northern Alaska.

F. Manufacturing—reviewed.**G. Commerce—reviewed.****H. Scenic Centers.****I. Adirondack Mountains.****1. Location.****2. Extent.****3. Appearance.****a. Mountains; form, height.****b. Forests; size, kinds of trees.****c. Lakes; number, size, form, origin.****d. Streams; number, size, velocity.****e. Camps; "open," inclosed.****f. Blazed trails.****g. Hotels and guides.**

Note.—Magazine pictures, souvenir postal cards, and "snap-shots" used in class.

4. Hygienic and aesthetic value of this region.**a. Conditions for rest and recreation.****b. Health-giving atmosphere.****c. Facilities for the study of, and development of love for, nature.**

Read Bryant's Forest Hymn.

Illustrated talks in the lecture-room.

Note.—In a similar manner study the Catskills, Thousand Islands, Yellowstone Park, etc.

EURASIA

The reasons for studying Eurasia next after North America are obvious. People from Eurasia discovered, explored, and settled North America. Our commercial interests are largely with Eurasian nations. The thousands of emigrants coming annually to our shores are almost wholly from Eurasia. The adults fill our factories and mines, and their children crowd our schools.

Eurasia is first located on a large globe, then on map of the world

(Mercator's projection), afterward a map of Eurasia, in relief, is placed before the class.

The Eurasian countries studied in the fourth grade (Lessons on the World as a whole) are reviewed as to location, climate, and climatic effects on life. Children recall what useful articles we get from each of these countries.

The first treatment of Eurasia is similar to that of North America.

A. Agriculture.

I. Wheat culture.

1. Location of wheat regions.

Note.—Review conditions found favorable for wheat culture in our own continent. From relief maps select regions adapted for wheat culture in regard to slope, soil, temperature, and rainfall.

- a. Southern Russia and Southern Siberia.
- b. France.
- c. India.
- d. Austria-Hungary.
- e. Germany.
- f. Italy (Po Valley).

Compare these regions with regard to size, temperature, rainfall. See temperature and rainfall maps of the world in Longmans' *New School Atlas*, late edition.

Compare the wheat regions of Eurasia with the wheat regions of North America as to latitude. Note variations in climate and topography, and their effects upon wheat growing.

Compare density of population of Russia with that of western Europe. As a result of comparison show that western Europe must buy wheat. Buys of Russia and the United States.

Germany consumes her entire wheat crop in about six months; Great Britain, in about three months.

2. Great wheat centers. Reasons for these centers, also for being where they are. Odessa, Bombay, Budapest, Dantzic, St. Petersburg.
Locate these cities on maps in geographies.
3. Transportation routes from wheat regions to wheat cen-

ters. Note in order the lines of railroads, the canals, and navigable rivers.

Children trace routes with care.

4. Foreign ports to which Russia, India, and Austria-Hungary send their surplus wheat in bulk or ground into flour. France sells a part of her wheat crop to Great Britain, and then buys of Russia to fill the deficiency. Russia sells nearly all of her wheat crop to the countries of western Europe.

Trace the routes from wheat centers to foreign ports. Name in order all waters crossed.

II. Flax culture.

Russia, Belgium, Ireland, Germany.

III. Mulberry (*morus alba*) culture (the silkworm).

China, Japan, Italy, Turkey, France, Spain.

IV. Grape culture (raisins, wine).

France, Italy, Spain, Portugal, Turkey-in-Europe.

B. Grazing.

C. Lumbering.

D. Mining.

E. Fishing.

F. Manufacturing and commercial centers.

Glasgow, Manchester, Leeds, Birmingham, Sheffield, Belfast, Paris, Ghent, Geneva, Zürich, Lyons, Tokio, London, Liverpool, Southampton, Hamburg, Christiania, Copenhagen, Genoa, Budapest, Cologne, Havre, St. Petersburg, Bombay, Calcutta, Canton, Hong Kong, Yokohama.

In what country and on what water is each of these cities? For what manufacture is each noted? What are the leading imports and exports of each? Pupils answer these questions from their geographies.

G. Scenic centers.

I. The Alps.

Note.—Forty million dollars annually spent by tourists in Switzerland.

II. The Rhine.

III. The Lake regions of the British Isles.

Note for what each scenic center is remarkable, and what the attractions are for tourists.

(To be continued.)

REVIEW

METHODIK DES UNTERRICHTS IN DER ERDKUNDE. Ein Hilfsbuch für Seminaristen und Lehrer von Heinrich Fischer, Breslau, Ferd. Hirth. 1905.

THE student of foreign methods of teaching will find this little book very interesting reading. While it is true that each country develops its own system of education which is adapted to its own needs and could not be transplanted into another country where conditions may be entirely different, a study of the ways in which the educators of the various countries try to overcome the special difficulties which confront them is always helpful and may suggest to us in a certain degree how to overcome our own. The book has been written for the instruction of students and young teachers of geography, and the first, general part, with its advice how to become a good teacher of geography, will not fail to benefit readers of any nationality. The second and more special part is given to the discussion of the practical problems connected with the details of the course in geography, and here the American will probably note most of all, the emphasis laid on map work in preference to text-book study. If he sees the educative value of these exercises, he cannot fail to become an ally of those who are working to establish a higher standard of excellence for the cartographic productions of this country. On the other hand it is comforting to see that even in a country where the place of geography in higher and lower education has so long been recognized, the author should feel that it is still too young a science for having developed a definite methodology. Dr. Fischer's book will no doubt prove a very important contribution toward the attainment of this goal.—M. K. G.

RECENT PUBLICATIONS

THE BRITISH COLONIES AND THEIR INDUSTRIES. By Wm. P. Gresswell; second edition, pp. 191; George Philip & Son, London, 1905.

A second edition of a useful little book dealing with the Commercial geography of the British Colonies. Considers the leading products and their preparation for the market in an interesting way.

AN ELEMENTARY CLASS BOOK OF PHYSICAL GEOGRAPHY. By William Hughes, revised by R. A. Gregory; pp. 118; George Philip & Son, London, 1905.

A very brief and much condensed summary of the elements of physical geography and the geography of plants and animals.

A DICTIONARY OF ALTITUDES in the United States. Fourth edition, compiled by

Henry Gannett; Bulletin 274, U. S. Geological Survey, pp. 1072; Government Printing office, 1906.

A valuable book of reference showing altitudes determined by authoritative surveys.

TEACHERS' GEOGRAPHY. A Syllabus and Note Book, Maps and Climates with 31 Practical Exercises. By Mark S. W. Jefferson, Michigan State Normal College, 1906.

Outline of a Teachers' Course of twelve weeks given in the Michigan State Normal College, with maps, diagrams, and necessary note paper. The exercises are well chosen, well expressed, and valuable for giving training in using maps and in understanding climates.

Not designed as a complete laboratory guide for the subject, but merely arranged for a course that must of necessity be very brief and to the point.

THE WORLD WIDE ATLAS of Modern Geography. 128 plates and index. W. and A. K. Johnston, Edinburgh and London, seventh edition, 1906.

An excellent reference atlas for a school library. Contains many inset maps of cities and ports. Each continent shown physically, politically and by sections. One of the few school atlases published in England and treating the United States adequately.

AN ATLAS OF COMMERCIAL GEOGRAPHY. Edited by R. Ferguson Savage; 36 plates and index; W. and A. K. Johnston, Edinburgh and London, 1906.

The maps of world showing climate, surface, communications, distribution of vegetable, animal and mineral products are especially valuable for use in commercial geography.

ARTICLES IN CURRENT GEOGRAPHICAL MAGAZINES

TRANSPORTATION METHODS IN ALASKA, George S. Gibbs. *National Geographic Magazine*, February, 1906.

An interesting illustrated account of methods of travel in Alaska, especially in winter.

WINNING THE WEST, C. J. Blanchard. *National Geographic Magazine*, February, 1906.

A summary account of the development of the chief irrigation project now in progress or recently completed in the west. Strikingly illustrated.

MOROCCO, THE LAND OF THE EXTREME WEST, Ion Perdicaris. *National Geographic Magazine*, March, 1906.

An entertaining and illuminating account of Morocco and the experiences of the author while held captive and waiting for a ransom. Illustrated by many full page and several smaller views showing lives of people and their homes.

OUR HETEROGENEOUS SYSTEM OF WEIGHTS AND MEASURES, Alexander Graham Bell. *National Geographic Magazine*, March, 1906.

An account of the difficulties of using our present systems of weights and measures and of the reasons for adopting the metric system. Should be read by all who are in doubt on this matter.

THE HISTORY OF THE GEOGRAPHY OF SCOTLAND, Sir Archibald Geikie. *Scottish Geographical Magazine*, March, 1906.

Illustrated by characteristic views of existing features and by a series of eight maps showing the distribution of land and water at different ages.

NOTES

PHYSICAL GEOGRAPHY IN THE SECONDARY SCHOOLS.—Teachers of Physical Geography all over the country will be interested in the Syllabus on that subject prepared for the secondary schools of New York State. This appears in Bulletin 27 on Secondary Education, issued November, 1905, by the New York State Education Department. Some nineteen pages are devoted to an outline of the class exercises, laboratory and field work. It is intended that the matter presented shall represent a satisfactory second year course designed to meet the college entrance requirements in Physical Geography, but provision is made for a somewhat more advanced fourth year course by inserting additional matter in small type.

I have recently made a careful comparison between several of the leading text-books on Physical Geography and the New York syllabus. To any one who has glanced over the syllabus it is needless to say that no one of the texts presented a consideration of all the topics given in the outline. Indeed, there were notable omissions in each text. This was to be expected, for while it is stated that "the plea that particular text-books are deficient will not be accepted in extenuation of inadequate knowledge," attention is called to the fact that "it will be quite impossible for any one class in the time allotted to study exhaustively all the topics mentioned, and no one text-book would furnish the material for such exhaustive study."

Examination questions are so arranged that the student prepared upon a proper proportion of the topics should pass without difficulty. It is only natural, however, that teachers should want a text which treats as many as possible of the topics given in an authoritative syllabus, and that publishers should desire authors to meet the requirements of such syllabus as nearly as possible. It becomes of more than ordinary interest, therefore, to see what kind of a standard is set up by the syllabus of the New York State Education Department in this subject. Several points suggested by somewhat detailed study are here presented.

One is impressed, perhaps most strongly, by the modern methods of treatment and the thoroughness required. Surely a wonderful advance over former methods and subject-matter is marked by the standard now set for the New York schools. The rational element in geography is more strongly emphasized, the empirical treatment has the smaller place to which it is properly entitled. As to thoroughness, it would seem that the ground is as well covered as is possible in an elementary course. Indeed, it may well be asked if too large a mass of details is not prescribed. Granting

that the student is not held responsible for all matter covered by the syllabus, it would still seem that a gain in effectiveness might be had by omitting certain topics difficult of explanation to elementary classes, or which involve details of small importance as compared with the general scope of the outline. Regarding arrangement of topics, it is inevitable that every teacher and every author should desire certain modifications to suit his personal ideas as to logical sequence: and this is as it should be. The syllabus aims to indicate the ground to be covered, not to impose any barrier to a proper exercise of freedom in the order of presentation of the subject.

In the details of the outline one sees a number of points which he would like to change. In discussing the structure of the earth, the terms centrosphere, lithosphere, hydrosphere, as correlative of atmosphere, are of doubtful utility, and while occasionally found in text-books, are apt to give the student erroneous ideas, especially regarding our lack of knowledge of the earth's interior. Referring to rivers, old age is not the only stage of river development characterized by flood plains, meanders and ox-bow lakes, deltas and the conditions favorable to delta formation, as the syllabus would lead one to believe. Since the constructive action of ice is presented so fully as to include a discussion of moraines, drumlins, kames, eskers, and till plains, it would seem well to include some mention of those more striking features due to the destructive effects of ice, such as cirques, U-shaped valleys, lateral hanging valleys, fiords, etc. Other similar suggestions will occur to those who read the syllabus with care.

There would seem to be no excuse for the combination of errors and unfortunate selection of matter presented as classifications of rocks, on page 143. Think of a classification of rocks that groups sand and pebbles together with amethyst, chalcedony, sard, carnelian, onyx, sardonyx, blood-stone, opal, hydrophane, flint and hornstone! Or that places together as another group of *rocks* (minerals are treated in a later section) orthoclase, albite, labradorite, mica, hornblende, asbestos, pyroxene, talc, soapstone, serpentine, chlorite, garnet, tourmaline. Igneous rocks are divided into trap rocks and volcanic rocks,—basalt, greenstone, porphyry, and amygdaloid being given as the trap rocks; trachyte and lava as the volcanic rocks. Thus basalt and lava are two separate rocks, belonging in different parts of the classification! Granite is still placed with the metamorphic rocks, and along with it goes syenite. It would be difficult to imagine a more hopeless confusion of names of chemical elements and minerals, specific rock names and general class names, than is here presented, as a standard to guide the teacher in his work. It would be most unfortunate did not the

flexibility of the syllabus permit every teacher to substitute something wholly different for this portion of the outline.

With all its imperfections, the syllabus represents a marked improvement in the standards for instruction in physical geography.

DOUGLAS WILSON JOHNSON.

*Massachusetts Institute of Technology,
Boston, Mass.*

THE INDUSTRIES OF THE ARGENTINE REPUBLIC.—The Argentine Republic is not, properly speaking, an industrial country, yet the extent of its territory, the fertility of its soil, and its climate make it probable that its industrial activity may be greatly increased. Beginning as a cattle-raising country in its first stage of civilization, it has continued to develop agricultural industry, and now the basis for a manufacturing country is being established. The trade in cattle and other animals, birds, fish, and the like, has been, and will continue to be for a long time, its principal medium of commerce with the rest of the world; but as the modes of traffic shall improve, its profit from other industries will also increase.

The agricultural industry constitutes the second stage of its civilization, and its combination with the cattle-raising industry will contribute to their mutual progress. The country's principal means of livelihood is the production of first-class animal and vegetable products in large quantities, enabling it to supply the nations that need them. Thus it may contend advantageously with such countries as do not possess immense table lands made fruitful by innumerable rivers, as in the Argentine Republic. Progress in the manufacture of such articles as are in greatest demand and which concern the necessities of life will operate for the advancement of such industries which require cheap labor, skillful operators, potent special machinery, and large amounts of money. A moderate protection to growing industries constitutes a temporary expedient only. The industrial progress of the country, therefore, depends on the increase of population—a lack which will be supplied by the lapse of time.

When coal and iron may be taken from its mines in large quantities, when electricity, obtained from its abundant rivers, shall be used throughout the country, and when its population shall have increased, the Argentine Republic will be a nation that will not only consume its own manufactured products, but will export them as well.

In the meantime, national industries, by reducing the price that is paid to foreigners for the importation of articles and by educating the people in the habit of working, produce one of the greatest benefits that the Argentine Republic could receive.

"*Saladeros*," in the Argentine Republic, is a name given to that industry whose object is the preparation of meat and other substances so that they may be preserved in good condition during long journeys. The first "*saladero*" was for the preparation of salted meats and was established in the beginning of the last century. Since then, this industry has been continually growing, and at present there are 15 establishments for the preparation of salted meats, canned meats, etc., and for this purpose from 400,000 to 500,000 young oxen are killed each year.

These "*saladeros*" are immense establishments situated on the edges of rivers or on the border of the sea. Great quantities of cattle are killed therein; their meat is salted and the refuse likewise utilized; the skins are also salted or otherwise prepared; the bones are boiled and subjected to dry heat in order to extract the grease, etc., and the cleaned bones, horns, blood and other remains are utilized, all these being exported to such manufacturing countries as are in need of and use them for the manufacture of various articles. These establishments also produce large quantities of salted meat, which is exported to Brazil and the West Indies; skins of various kinds that are sent to Europe; bones being exported in their normal condition or otherwise, as are the grease, fodder, oil, salted blood, horns, entrails, and various other items obtained from the remains of the animals.

—*Monthly Bulletin of the Bureau of American Republics.*

PROTECTION OF THE CHINCHILLA.—At the last session of the Chilean Congress, a bill was passed prohibiting the killing of chinchillas within a certain season and providing penalties for violation of the law. But the natural habitat of the chinchilla in the wilds of the Andes Mountains makes detection and convictions for violation of the law regulating their killing difficult, and it seems probable that this valuable fur-producing animal, like many other wild animals indigenous to the forests and mountains of North and South America, is destined to early extinction.

United States Consul Mansfield, of Valparaiso, writes that chinchilla skins, much prized and highly valued in the United States, England, and European countries because of their beautiful color and fine quality of the fur, are a product of Bolivia and Chile only.

The chinchilla is a small animal that burrows in the ground, and resembles in general appearance a rat, except in the coat, which is a beautiful silken light gray fur. It is found in the Cordillera ranges of the Andes in Chile and Bolivia, the best quality coming from the latter country. They are found in great numbers in the higher mountain ranges. But like all animals whose skins have a high market value, chinchillas have been

killed with impunity in season and out of season in recent years. As a result they are threatened with extinction.

They are captured in various ways, but the most common method is to hunt them with dogs, the fox terrier being the most useful and skillful in their capture. The rapid extermination of the chinchilla and the absolute lack of protection or regulation in taking them has resulted in a tremendous advance in the price of the skins in the past two years. As an evidence of the commercial interest in the fur produced by this little animal, two American and two French firms keep expert purchasing agents in the field during the shipping season—January to July. Coquimbo, Chile, is the chief port of export, that being the port of shipment for the Bolivian product also. Last year there were exported from Coquimbo, 12,000 dozen skins, the majority of which went to the United States, one agent shipping 7,150 dozen, and another 2,500 dozen to their respective New York houses. Prices last year were almost double those paid the year previous.

—*Monthly Bulletin of the Bureau of American Republics.*

CURRENT ARTICLES ON COMMERCE AND INDUSTRY.—

February:

Advertising and the Salesman, *System*.

Alaska, Transportation Methods in, (Ill.) *Nat'l Geog. Mag.*

Coal Tar and Its By-Products, *Business Man's Mag.*

Congo, The Truth About, *Outlook*, Feb. 27.

Cotton-Picking Machine (Ill.), *Moody's Mag.*

Fruit, Saving California's Crops (Ill.), *Century*.

Haiti: What Shall Haiti's Future Be? (Ill.), *World's Work*.

Insurance, Federal Supervision of, *Moody's Mag.*

Iron Ore Unloading by Machinery (Ill.), *Sci. Am.*, Feb. 10.

Irrigation: The Government as a Homemaker, *World To-Day*.

Land Fraud Investigation, The Kansas, *World To-Day*.

Meat Trade, *World's, Crop Reporter*.

Packers and the Cattlemen, *Sat. Evening Post*, Feb. 3, 10.

Packers: An Answer to Mr. Armour, *Sat. Evening Post*, Feb. 10.

Philippine Railroad Developments (Ill.), *Moody's Mag.*

Pineapple Raising in Southern Florida (Ill.), *Country Life in Am.*

Railroads and the President, *Century*.

Rug-Making Community (Center Lovell, Me.) (Ill.), *Country Life in Am.*

Sheep, The Peculiar Value of Dorset (Ill.), *Am. Farming*.

Trolley Car as a Social Factor (Ill.), *World To-Day*.

E. D. J.

THE KNOWLEDGE OF SUBJECT-MATTER FOR A TEACHER OF GEOGRAPHY.—It goes without saying that the teacher should be master of the subject-matter contained in the ordinary text-books used in the regular schools of the country. This preparation should have been made in a thorough, practical manner, if possible, under the direction of a skilled, resourceful teacher. This is necessary in order, (1) that his knowledge may be clear and positive—a part of himself rather than a mere acquisition to be used only when he has need of it in a recitation; (2) that his information on the subject may be systematically arranged in his mind; and (3) that he may have a good, practical method of presenting the same to others.

Again, his knowledge of political and mathematical geography should be supplemented by a thorough course in physical geography. This is necessary to enable him to give full and explicit instruction in such subjects as surface, drainage, nature of soils, productions, currents, climate, including temperature, moisture and winds, and many other topics directly or indirectly connected with or related to the general subject as presented in the ordinary text-book.

His preparation should include, further, a wide range of reading bearing on the general subject of the world and its people. He should be familiar through reading or travel, or better through both, with the characteristic features of different countries, such as topography, climate, nature of seasons, vegetation, productions, occupations, characteristics of people, manner of living, amusements, education, forms of governments, etc.

In addition to these things, he should have a wide range of information gained from a personal observation of geographical forms and phenomena. His book knowledge may be accurate and complete, but it can never be as vivid in his mind as that which comes to him from observation, neither can he teach those facts obtained from books with the same force and effectiveness as those which he has acquired from personal contact with nature. He should, therefore, be a student of nature. He should be familiar with the various forms of water, such as mist, sleet, rain, snow, hail, springs, creeks, rivers, ponds, lakes, gulfs, bays, straits, and the sea; he should know from observation something of the action of water in motion, in the way of erosion, the transportation of silt, and the work of the waves; he should be acquainted with marine life and its relation to the great marine formations. He should know from observation much of the land forms, as islands, capes, peninsulas, isthmuses, hills, mountains, mountain peaks, valleys, canyons, plains, plateaux. If it is impossible for him to see mountains or rugged canyons in their native beauty and grandeur, he should seek, within his own environment, for them in miniature, and from these let his imagination build

them up into the typical forms which they may be taken to represent; he should climb the hills and mountains, wander through the valleys, penetrate the silent forests, and in so doing study the myriad forms of vegetable and animal life. Not only this, but his observation and study of nature should be made with reference to use in the class room, that is, he should have an eye to cause and effect in geography and, in so far as possible, be able to trace the relations from one to the other. Moreover, he should study all from the comparative standpoint—geographical forms and phenomena should be compared and contrasted, and from these, conclusions should be drawn touching the general facts observed.

From the Study of Geography, Intermountain Educator.

U. S. BOARD ON GEOGRAPHIC NAMES

DECISIONS—MARCH 7, 1906

Alamogordo: Election precinct and town, Guadalupe county, N. Mex. (Not Alamo Gordo.)

Bancroft: Mountain, on the county line between Clear Creek and Grand counties (southern part of S. 29, T. 23, R. 74 W.) Colo. (Not Lomand's, Millar's, nor Perry Peak.)

Battie: Mountain, Camden town, Knox county, Maine. (Not Beattie nor Beatty.)

Boulder: Creek, Matanuska Valley, 40 miles northeast of Knik arm of Cook inlet, Alaska. (Not Schoonhoven nor Schoonoven.)

*Brewster: Precinct and town, Okanogan county, Washington. (Not Bruster.)

Chickawaukie: Pond, Rockland and Rockport towns, Knox county, Maine. (Not Cichicwaukie nor Chickawaka.)

Death Valley: Valley, Inyo county, California. (Not Amargosa Desert nor Lost Valley.)

Elbow: Lake, four miles east of mouth of Thunder Bay river, Alpena county, Michigan. (Not Carp nor Crooked.)

*Hankow: Capital, province of Hupeh, China. (Not Hankau.)

Kings: Mountain on the east bank of Matanuska river, 40 miles northeast of Knik arm of Cook inlet, Alaska. (Not House.)

Lilly: Pond, Rockport town, Knox county, Maine. (Not Fresh nor Lily.)

Little Nesenkeag: Brook, tributary from the east to Merrimack river, Hillsboro county, N. H. (Not Chase's, Chases, Massenteean, Mossenteean, nor Reed's.)

*Reversal of former decision

Monroe: Island, southeast of Rockland, Knox county, Maine. (Not Munroe.)

Nesenkeag: Brook, tributary from the east to Merrimac river, Hillsboro county, N. H. (Not Brickyard, Chase, nor Great Nesenkeag.)

*Newchwang: Treaty port, province of Liaotung, China. (Not New-Chwang, Niu-chuang, Niu-Chwang, Niuchwang, nor Niutschuan.)

Sangerfield River: Branch of Chenango river, Chenango, Madison, and Oneida counties, N. Y. (Not Chenango Creek, East Branch Chenango River, nor East Chenango River.)

Shandon: Railroad station and village, Butler county, Ohio. (Not Glendower, New London, nor Paddy's Run.)

Soochow: City, China. (Not Soo-Chow-Foo, Soo-Tchoo, Sou-Tcheou-Fou, Su-chau, Su-Chew, Su-chow, nor Su-Chow.)

Talkeetna: Mountains and river, north of Cook inlet, on the east side of Sushitna river, Alaska. (Not Talkeet, Talkeetno nor Talkütna.)

Tee: Cove or harbor, Lynn canal, southeastern Alaska. (Not Stephens.)

Tulula: Creek, tributary to head of Cheoah river, and town, Graham county, N. C. (Not Tallulah.)

Walhalla: Plateau, Coconino county, Arizona. (Not Greenland nor Valhalla.)

Winooski: River, tributary from the east to Lake Champlain, Chittenden and Washington counties, Vermont. (Not Onion.)

PHYSIOGRAPHY AND GEOGRAPHY—THEIR RELATIONS, DIFFERENCES AND ESSENTIAL FIELDS.†—Theoretically, it is conceded that geography shall be taught in the grades and physiography in the high schools, but practically both are taught more or less all the way through. Hence, many do not see the boundary line which separates these two sciences. I speak of the subjects in the public schools only, because at present they are best known as parts of public school curricula, not because I believe they are or should be confined to these stages. Neither do I object to the above mentioned lack of differentiation in the elementary teaching.

Pupils came to us in the colleges and universities totally blind, as have been their teachers before them, to any real distinction between geography and physiography. The idea seems to prevail that the former includes the latter. Undoubtedly the use of the name physical geography for the latter cultivates the notion. Truly they are related but not quite in that way.

*Reversal of former decision

†Read at the Cincinnati Meeting, Ohio St. Acad. of Sci., Dec. 2, 1905.

Physiography, if not able to go alone, is more properly considered a corporate part of geology. What then is the relation existing between these two sciences? Can one be studied without the other? Which one should receive attention first? Are they so related that they may be concurrently studied?

These questions will be discussed in inverse order. In elementary work the pupil's interest centers in, and radiates from, the human or life element. So in his geography he finds man harvesting grain with a cradle in Vermont, with a two or three-horse reaper in Ohio and a steam header in Southern California, and he asks why. The answer comes in noting the topography, soil, and climate, and the condition of, and uses for, the straw. He incidentally learns something of the physiography of the places studied in order to explain the relations and responses which he has found. He reads of the arid climate of the Great Plains and then discovers the influence of the Rockies in producing the aridity, and ultimately comes to appreciate several points about mountains. He finds the railroads coming into Indianapolis and Columbus from all directions while they enter Cincinnati, Albany and Helena from only three or four. The teacher calls attention to the topography and he learns facts about plains and prairies, about mountains, passes and valleys. But through it all he is studying geography, not physiography. He is using simple, physiographic facts to explain and answer geographic questions. It is time enough to introduce the physiographic when the geographic requires it.

Again, when in physiography he studies the life history of a plateau and traces the feature from its geotectonic uplift through the steps of its dissection and ageing, watching its valleys first deepen, then widen, and its level topped divides melt away to crests with long slopes, while the valley floors widen to occupy half or two-thirds of the region, he may incidentally note that the population and highways occupy the tops of the hills—the plateau surface—in youth, that the culture descends the slopes as the valleys mature, and that in maturity transportation routes, cities, and most of the people are in the valleys while the hill tops are left to pasture or forest. To sum up, a few facts in either science are gathered in the pursuit of the other, but the two subjects do not develop concurrently.

To the second question, "which should receive the attention first," the answer depends upon the age and maturity of the pupil. If a child, geography first everytime. If a mature student, he may well prepare for geography by a strong course in physiography; but the phenomena, reasoning, and philosophy of the latter are far beyond the experience and power of the child, to say nothing of the locus of his interest.

The remaining question, "can one be studied without the other," has

been at least partly answered. In physiography, one does not need to learn many facts of geography, and he certainly ought not to follow up the relations to man and his responses to the influence of the conditions, far enough to detract from the systematic development of his subject. In geography, he uses the facts of this related science as he does those of history, sociology and anthropology, but he does not attempt to grasp its philosophy.

Turning to the second division of the subject, "their differences" it is apparent from what has preceded that they often deal with the same features and phenomena. They seem in many topics to use the same basal materials but in a different way. For illustration—in physiography the valley is a topic. It is described, its origin and the evolution of its parts are discussed. Its development is traced and a definite age is ascribed to it. Its end is predicted. Its genetic relation to the surrounding region is discussed. In geography, the same valley is noted as a control of the movements of men and goods, as a home for a state, clan or a certain group of men, or as the seat of adapted industries. Its commercial or economic relations to the surrounding region are noted.

Another illustration is furnished by the river. In physiography, its course through the valley and the regional topography is considered; the work accomplished in its normal development; its method of procedure in carving its valley, enlarging its curves, extending its course, and broadening its territory; its relation to other streams, to lakes or the ocean. But in geography the transportation facilities offered, the power made available, the possibilities for irrigation, city water supply, and park and scenic uses, these are the subtopics. Its location, whither it leads, what cities on its banks and why; the inter-relation and the inter-action of man and the river, there are its interests. In a similar way the plain and mountain, the sea and shoreline receive different treatment in the course of the development of the two subjects.

These sciences, however, are not different from others in this respect; for chemistry, geology and physics all deal with matter and natural forces, and history, economics, and sociology all study man's institutions.

The difference between geography and physiography is one of point of view. Physiography concerns itself with the description, and the classification of physiographic forms on the basis of the cycle, process or the family; geography with the relations of these same forms to man. In the former the principle is systematization; in the latter, relation. For example, take a plain. In physiography its characteristics are listed, its origin is determined, its age in its normal cycle of development, the processes in operation upon it, and its relation to the surrounding topographic

features. A comparison with other plains is made and the types are discussed until the specific feature, say the coastal plain of Alabama and Mississippi, has been referred to its type and class, to its variety and age. It may be called a belted coastal plain, submaturely dissected in its inland portion and less dissected and slightly drowned along the coast. Systematization is the objective.

In geography the same plain comes up as the home of the cotton growing industry. The especial adaptations to this business and to others are discussed; the features of the plain to which transportation responds, the location of its cities, roads and ports, the distribution of its crops and minerals, population and industries are shown to be related to its levelness, its belted structure, its stage of dissection, and the position of its harbors and other commercial outlets. In all these points it may be compared with other plains. In these *relations* centers the interest, and through their recognition comes the gain to the student.

This essential difference appears early in the study but becomes clearer as each subject emerges from the high school curriculum. Beginnings are made, and some facts learned, but the complete organization of the truth pertaining to the science cannot be accomplished in elementary schools nor by immature pupils. Just as nature study introduces the plant and animal kingdoms to the child and high school zoology and botany continue to familiarize him with them, so as to pave the way for college and university research into the fundamental principles of the sciences of zoology and botany; so nature study, and subsequently geography and physiography, supply basal conceptions for the extended quest for knowledge in the separate sciences of our subject.

We are now prepared for a brief treatment of the third division of the subject, "their essential fields." We have gone far enough already to begin to see the scope of each. Physiography describes, classifies, and discusses the origin of the features of the earth. It compares similar and dissimilar, related and unrelated forms, always seeking to reduce the multitudinous variety to a system, to group likes and correlate related specimens. It concerns itself with the physiographic processes and forces of the earth, air, and sea and endeavors to explain all the workings of all, and to understand the nature of all physiographic features. Such a field and purpose constitute physiography a science. They proclaim it to have problems, easy and hard, short and long, solved and unsolved, and I may say, solvable and unsolvable. All this means, further, that the elementary introduction, which the high school boy receives, to the general subject does not acquaint him with the science. It only puts him in touch with

some of its facts and theories, and enables him to see and work out for himself, other truths; or to pursue the subject more at length in the University.

And geography possesses a field more biotic, anthropic, and industrial but centering in the relation of the anthropic phenomena to the physiographic. It seeks to discover all responses of mankind to his physical environment; to show how human industries are related to the distribution of natural resources and to the facilities for moving and marketing them; to show why man lives where he does and as he does so far as these depend upon the physiographic, climatic, and geographic conditions or upon the distributions of natural features or phenomena; to trace his institutions, the elements of his character and the nature of his aspirations as far as they are related to the physical surroundings; and, having accumulated all these data, to reduce them to systems, and to organize them into laws and principles. Geographers have been working in this field for two milleniums and a vast body of material has been collected. Much of the material has been classified; laws have been found, principles discovered, and, to-day, one of the oldest of sciences is again finding itself.

Here, too, only beginnings are mastered in the elementary schools. In subject-matter, both quality and quantity, and in method of treatment and philosophy, geography in its higher phases is a university subject. Universities in France, Germany, Austria and to some extent in other countries, have prepared for the study of geography in their courses. Two or three American Universities give some systematic instruction in advanced geography. Many more should and, I trust, will, if for no other reason than the utilitarian, the preparation of teachers for elementary and secondary schools and the equipment of men for business, diplomatic, and government positions where a knowledge of the principles of geography is of inestimable value.

To sum up, then, physiography and geography are two distinct sciences. They each contribute to the full appreciation of the other; especially does the former minister to the latter. They often deal with the same basal materials, but not in the same way nor to the same end. Physiography describes and classifies physiographic features and discusses the processes and agencies by which they are made. Geography shows the relations existing between man and his physical environment and classifies the influences and responses.

Geo. D. Hubbard, Ohio Naturalist, Jan., 1906.

PEARLS FROM LOWER CALIFORNIA.—The quaint little old seaport of La Paz, at the extreme Southern tip of the peninsula of Lower California,

is still the most important pearl fishing community on the Pacific Coast of America, and among the three most important towns for pearl fisheries in the world, says a writer in the *New York Times*. Manuel Aguilera Menendez, Governor of the Mexican Territory of Lower California, recently reported to the Governor at the City of Mexico that La Paz's product of pearls for the last year was \$2,145,000. The largest and finest pearls found anywhere in the last few years have come from the fisheries in the Gulf of California, which have their headquarters at La Paz. The gems are taken directly from La Paz to lapidaries and wholesale dealers in the City of Mexico, New York and Paris.

For centuries the waters in the vicinity of La Paz have been scenes of pearl fishing operations. Fortuno Ximines, a lieutenant of Hernando Cortez in the conquest of Mexico, was the discoverer of La Paz. That was in 1522. Ximines's diary is still at Vera Cruz and in it he tells of finding aboriginal chiefs living in rude wickiups along the seashore, with quantities of valuable pearls lying carelessly about. The Spanish believed that pearl fishing had been conducted in the Gulf of California (known then as the Gulf of Cortez) for untold generations. From one tribe of aborigines along the gulf shore near Hermosillo the conquerors wrung ransoms in pearls worth many thousands of dollars.

La Paz has a population of about 2,500. Four-fifths of them are Mexicans, and the rest are French, Americans and Germans, drawn there by the pearl fisheries. The town is huddled close upon the water's edge, and with its crude old stone and adobe houses, its tile roofs, its plaza with tropical trees, gorgeous flower beds, under perennial sunny skies, and narrow winding streets, is a picturesque resort. The French and American firms and companies that deal in pearls and oyster shells have large, ancient warehouses with thick walls and iron-grated windows. Within the warehouses are tons of oyster shells waiting shipment to Europe and the United States, vast quantities of diving garments and accouterments and stores for the fishing crews. The pearls are kept in queer old iron safes, which in turn are stored in vaults. Years ago, before Hermosillo became a rival in the pearl trade, La Paz was a bustling community. Now it is a sleepy place, where the only events that ever arouse it are the going out and coming in of the fishing crews. The sole topic of conversation in La Paz concerns pearls and the market for pearl oyster shells. Nowadays the market for pearls is the very best.

The pearl fishing season along the inner shore of Lower California almost always lasts through July, August, September and October. The season on the Pacific Coast side of Mexico and Central America usually

begins in March and closes when the season of sudden whirlwinds and hurricanes (so common in the tropics) begins in June. The pearl fishers are the divers, who go down on the floor of the sea and gather together the shells of the mollusks. The pearl hunters are a more numerous set of men (usually old men who have grown feeble and useless physically in the diving). They work in long open sheds along the shore, close by the companies' respective offices and under the watchful eye of an overseer. The pearl hunter opens carefully each shell, examines it closely, all the time using his fingers for feeling for the precious pearl. The gems are so rarely found that only thirty or forty little pearls and possibly one the size of a pea, are found sometimes in two tons of shells. To harvest a ton of pearl-bearing oyster shells takes several divers two or three weeks. The pearl is formed either by the intrusion of some particle that irritates the oyster, causing it to cover the irritant with a coat of nacre, which, when hardened, becomes the pearl, or, as many divers believe, by a parasite, for it has been found that old shells bored throughout by these parasites contain the largest and finest pearls. The pearl is found imbedded in the oyster, and not, as many suppose, attached to the shell.

The pearl oysters are not found in beds like edible oysters, but are scattered singly over a large area, the diver sometimes having to walk many miles before filling his wire basket. The shells are about the size of small soup plates, weighing about a pound each, and shaped much like our oyster shell, only more round. Sometimes in grasping a shell the hand of the diver comes in contact with a stone fish, so named by the divers, a venomous little fish, hiding under rocks and shells and secreting poison. This fish punctures the skin of the hand, causing the entire arm to swell, with great pain. The remedy is to remain below and suffer, for the pressure of the water causes the wound to bleed freely and the poison thus escapes.

As in gold-mining camps, there are days of excitement because of unusually rich finds of pearl-bearing oysters. A fishing fleet may come in from a new locality with an abundance of valuable pearls, and, under strict orders of the company operating them, will keep the location a secret. But rival companies are bound to find, in some of their numerous ways of learning such secrets, the spot where the pearls have been found. At once there is a stampede there of companies and individual pearl fishers. Sometimes there are rows among the fishers concerning the priority of rights to fish for pearl-bearing oysters in these waters, and one hears at La Paz many a grewsome tale of this or that person or crew who went out from La Paz to invade another person's or crew's fishing domain and never came back.

A few years ago the value of pearls taken in La Paz caused a rush to the ground equaling that of the gold fields. One pearl weighed seventy-five carats, and was sold for \$14,000; another, perfect in shape and finely tinted, brought \$5,000. One of the largest pearls found here in the last century brought \$50,000. One of the best years for pearls in modern times was 1881, in which a black pearl was found of twenty-eight carats' weight, which brought \$10,000 in Paris. In 1882 two were found weighing thirty-one and forty-five carats, which realized \$11,000. In 1883 a light brown pearl was found which weighed sixty-five carats, and sold for \$8,000, while a pear-shaped pearl brought \$7,500.

A teacupful of pearls and about 3,500 tons of shells is a profitable year for the largest pearl fishing companies at La Paz. The oyster shells are sold to buyers for French, Dutch and New England button factories. One firm at Brussels has a standing order for 2,000 tons of mollusk shells of certain variety each year. A teacupful of pearls of the average size comes to about \$19,000. But in such quantity of gems there will very likely be a dozen or twenty pearls of extra fine color and rare size, so that the value of the season's work is enhanced \$20,000 or \$30,000. The colors of the pearl in the Gulf of California are white, blue, black and green, and the best nowadays are worth from \$1,000 to \$4,000 each. The finest pearl found is a black pearl of seventeen carats' weight. The green and blue pearls are not found in all the fisheries in the world.—*Modern Mexico*, January, 1906.

NEWS ITEMS

Owing to the recent appalling calamity in San Francisco, no meeting of the National Educational Association will be held this year. Cheap excursions to the Pacific coast, including all expenses, will, however, be arranged by certain of the Eastern railroads. These excursions will include the Grand Canyon, Colorado, Central California, Portland and the Yellowstone.

The article on geography equipment announced for this number of the JOURNAL has been postponed until June on account of lack of space.

THE JOURNAL OF GEOGRAPHY

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EQUIPMENT FOR GEOGRAPHY TEACHING

THE list of equipment for geography teaching in Elementary and Normal schools, seen below, is based on an exhibit recently held at Teachers College, Columbia University, and to which generous loans were made by publishers and map agents.

CONTINENTAL AND WORLD MAPS

Johnston Series, exhibited by W. B. Harison, New York City:

World, showing possessions of United States.

North America.

North America (International Series).

United States and Mexico.

Physical Map of the World.

Physical Map of United States and Mexico (Grand Series).

Physical Map of Europe.

Imperial Map of World in Hemispheres.

World, Mercator Projection (International Series).

Commercial Chart of the World.

British Isles.

Also similar Maps of Asia, Africa, South America and Australia.

Excelsior Series, exhibited by J. L. Hammett Co., New York and Boston:

North America.

United States and Mexico.

World, Mercator Projection.

South America.

Asia.

Europe.

Africa.

Australia.

Also same maps in outline without names.

Peerless Maps, exhibited by Scarborough Company, Indianapolis:

North America.

South America.

Europe.

Asia.

Africa.

Australia.

Columbia Series, exhibited by Rand, McNally & Co., Chicago:

North America.

United States.

Germany.

British Isles.

World, Mercator Projection.

Australia and Polynesia.

Africa.

Asia.

South America.

Series of maps of individual continents in portable case, exhibited by Rand, McNally & Co., Chicago:

France, Hachette & Co., exhibited by Scarborough Co., Indianapolis.

Europe, Philip's Schoolroom Map, exhibited by W. B. Harison, New York.

World, Philip's Schoolroom Map, exhibited by W. B. Harison, New York.

Roman Empire, exhibited by Rand, McNally & Co., Chicago.

Relief Map of Rhine, Koehler, Leipzig.

Bamberg's Map of Africa, exhibited by the Scarborough Co., Indianapolis.

Habenicht-Sydow Physical Maps, exhibited by J. L. Hammett Co., Boston and New York:

North America.

Europe.

Asia.

Africa.

Chart of World, Mercator's Projection. Justus Perthes, Gotha, Germany.

Maps of New York and Vicinity:

New York City (large wall map), exhibited by C. S. Hammond, New York.

Montauk Point to New York, U. S. Coast and Geodetic Survey.

Geological Map of New York, New York State Museum.

Waterworks System of Long Island, U. S. Geological Survey.
New York City and Vicinity, U. S. Geological Survey.
Geological Map New York City and Vicinity (from New York City
Geologic Folio), U. S. Geological Survey.
View of New York and Vicinity, W. B. Harison.
Educational Map of New York City, A. L. Smith.
Topographical Map of Eastern New York and Western Connecticut,
made by mounting together individual sheets of U. S. Topo-
graphic Maps.

Miscellaneous Maps:

Mississippi River from Cairo to Gulf, Mississippi River Commission.
Monthly Pilot Chart of North Atlantic, U. S. Hydrographic Office.
Weather Map, Weather Bureau, U. S. Department of Agriculture.
Straits of Magellan, made by mounting together maps of U. S. Hydro-
graphic Office.
U. S. Topographic Map, 100 feet Contours, U. S. Geological Survey.
Same map used as base map for showing Standard Time Divisions.
Same map used as base map for showing Physical Divisions of U. S.
Principal Transportation Routes of World, Bureau of Statistics, De-
partment of Commerce and Labor.
Land Office Map of California.
Outline Map of World, used as base for showing distribution of Rain-
fall.
Outline Maps, exhibited by D. C. Heath & Co.; Longmans, Green &
Co.; W. B. Harison; Atkinson, Mentzer & Grover.

Relief Models:

South America, E. E. Howell, Washington.
Africa, E. E. Howell, Washington.
New York, E. E. Howell, Washington.
New York Harbor, Lower Bay Entrance Channels, E. E. Howell,
Washington.
Eurasia, E. E. Howell, Washington.
North America, E. E. Howell, Washington.
New York and Vicinity, E. E. Howell, Washington.
Australia, E. E. Howell, Washington.
Harvard Geography Models, Ginn & Co.,
Mountains Bordering the Sea.
Coastal Plain and Mountains.
Embayed Mountains.

United States, showing restoration Ancient Ice Sheet, E. E. Howell, Washington.

Relief Map United States, showing Annual Rainfall and Temperature, E. E. Howell, Washington.

Volcanic Island, A. Heim, Wurster & Co., Zurich.

Model of Seashore, A. Heim, Wurster & Co., Zurich.

Model of River Valley, A. Heim, Wurster & Co., Zurich.

Use of Contours, H. Keeler, Central Scientific Co.

Mt. Shasta, H. Keeler, Central Scientific Co.

Niagara River and Vicinity, H. Keeler, Central Scientific Co.

Globes, Political, Rand, McNally & Co., Chicago.

Globes, Political, Johnston, W. B. Harison, New York City.

Globes, Political and Physical, C. S. Hammond, New York City.

Globes, Blackboard, C. S. Hammond, New York City.

Atlases:

Hand Atlas, Stieler, J. Perthes, Gotha.

Hand Atlas, Andrees, Velhagen & Klasing, Leipzig.

Success Handy Reference Atlas and Gazetteer of the World, G. F. Cram, Success, New York.

Physical Atlas, Meteorology, Vol. III, Bartholomew.

World Wide Atlas, Johnston, London.

Atlas of the World's Chief Industries, G. Philip & Son, London.

Atlas of Commercial Geography, R. F. Savage, Johnston, London.

Modern School Atlas, R. F. Savage, Johnston, London.

Model Atlas, R. F. Savage, Johnston, London.

Systematic Atlas, Ravenstein, Johnston, London.

New School Atlas: Chisholm & Leete; Longmans, Green & Co.

Dollar Atlas of the World, Rand, McNally & Co.

London School Board Atlas, G. Philip & Son.

Elementary Atlas of Comparative Geography, G. Philip & Son.

Schul Atlas: Keil & Riecke; Hofmann, Gera.

London School Atlas: Arnold-Forster; London School Atlas Co.

Indexed Atlas of the World, Rand, McNally Co.

United States.

Foreign Countries.

Universal Atlas of the World, Rand, McNally Co.

Gazetteers:

Gazetteer of the World: Chisholm; Longmans, Green & Co.

Lippincott's Gazetteer: Heilprin; J. B. Lippincott & Co.

ELEMENTARY SCHOOL TEXTS

- Tarr & McMurry's Geographies, 5 Book, 3 Book, 2 Book Series: The Macmillan Company.
- Dodge Geographies, 2 Book, 4 Book Series: Rand, McNally & Co.
- Natural Elementary Geography, J. W. Redway, American Book Co.
- Natural Brief Geography, J. W. Redway & R. Hinman, American Book Co.
- Natural Advanced Geography, J. W. Redway & R. Hinman, American Book Co.
- Illustrated School Geography, A. J. Herbertson, Edward Arnold, London.
- Elementary Geography, C. F. King, Chas. Scribner's Sons.
- Elementary Geography, H. J. Roddy, American Book Co.
- Complete Geography, H. J. Roddy, American Book Co.
- Elements of Geography, A. E. Frye, Ginn & Co.
- Grammar School Geography, A. E. Frye, Ginn & Co.
- Longmans' Geography: Chisholm & Leete; Longmans, Green & Co., London.

PERIODICALS

- Scottish Geographical Magazine, Scottish Geographical Society, Edinburgh.
- The Geographical Teacher, edited by A. J. Herbertson, G. Philip & Son, London.
- National Geographic Magazine, National Geographic Society, Washington, D. C.
- Bulletin of the American Geographical Society, New York City.
- The Journal of Geography, New York.
- Annales de Géographie, Armand Colin, Paris.
- Bibliotheca Geographica, Gesellschaft für Erdkunde, Berlin.

SECONDARY SCHOOL TEXTS, PHYSICAL AND COMMERCIAL GEOGRAPHY AND GEOLOGY

- Eclectic Physical Geography, R. Hinman, American Book Co.
- Elementary Lessons in Physical Geography, A. Geikie, Macmillan & Co., London.
- Science Primers, IV Physical Geography, A. Geikie, Appleton.
- First Book of Physical Geography, R. S. Tarr, The Macmillan Company.
- Elementary Physical Geography, R. S. Tarr, The Macmillan Company.
- New Physical Geography, R. S. Tarr, The Macmillan Co.
- New Physical Geography, E. J. Houston, Hinds, Noble & Eldredge.
- Elementary Physical Geography, J. W. Redway, Chas. Scribner's Sons.
- Introduction to Physical Geography, Gilbert & Brigham, Appleton.

- Lessons in Physical Geography, C. R. Dryer, American Book Co.
Revised Text Book of Geology, J. D. Dana, American Book Co.
Elements of Geology, W. H. Norton, Ginn & Company.
Compend of Geology, J. LeConte, American Book Co.
The Realm of Nature, H. R. Mill, Chas. Scribner's Sons.
Elementary Physical Geography, W. M. Davis, Ginn & Company.
Commercial Geography, J. W. Redway, Chas. Scribner's Sons.
Commercial Geography, L. W. Lyde, A. & C. Black, London.
Commercial Geography of the British Isles, A. J. Herbertson, W. & R. Chambers, London.
Commercial Geography of the World Outside of the British Isles, A. J. Herbertson, W. & R. Chambers, London.
Elementary Commercial Geography, C. C. Adams, Appleton.
A Commercial Geography, C. C. Adams, Appleton.
Geography of Commerce, S. Trotter, The Macmillan Company.
Commercial Geography, Gannett, Garrison & Houston, American Book Co.
Handbook of Commercial Geography, C. G. Chisholm, Longmans, Green & Co.
- Laboratory Manuals:
- Observations and Exercises on the Weather, J. A. Price, American Book Co.
 - Laboratory and Field Exercises in Physical Geography, G. H. Trafton, Ginn & Company.
 - Laboratory Manual for Physical Geography, F. W. Darling, Atkinson & Mentzer.
 - Students' Laboratory Manual of Physical Geography, A. P. Brigham, Appleton.
 - Introduction to Practical Geography, Simmons & Richardson, The Macmillan Company.
 - Glencoe Loose-leaf Note-book Cover, Atkinson, Mentzer & Grover, Chicago.
 - Teachers' Geography. A Syllabus and Notebook, M. S. W. Jefferson, Ypsilanti, Mich.
 - Outlines, Suggestions and References in Commercial Geography, G. W. Sanford, Powers & Lyon, Chicago.
 - Field and Laboratory Exercises in Physical Geography, J. F. Chamberlain, American Book Co.
 - A Laboratory Manual for Physical Geography, F. W. Darling, Atkinson, Mentzer & Grover, Chicago.

THE TEACHING OF GEOGRAPHY

The New Basis of Geography, J. W. Redway, The Macmillan Company.

Topics in Geography, W. F. Nichols, D. C. Heath, Boston.

Teachers' Manual of Geography, J. W. Redway, D. C. Heath & Co.

Teaching of Geography, A. Geikie, The Macmillan Company.

Special Method in Geography, C. A. McMurry, The Macmillan Company.

Exercises in Geography, C. H. Leete, Longmans, Green & Co.

How to Study Geography, F. W. Parker, Appleton.

A Teachers' Manual of Geography, C. A. McMurry, The Macmillan Company.

Type Studies in United States Geography, C. A. McMurry, The Macmillan Company.

Excursions and Lessons in Home Geography, C. A. McMurry, The Macmillan Company.

Lessons in the New Geography, S. Trotter, D. C. Heath.

REFERENCE BOOKS FOR TEACHERS

Philippine Life in Town and Country, Le Roy, Putnam's Sons.

Japanese Life in Town and Country, Knox, Putnam's Sons.

Indian Life in Town and Country, Compton, Putnam's Sons.

Australian Life in Town and Country, Buley, Putnam's Sons.

Chinese Life in Town and Country, Bard, Putnam's Sons.

Italian Life in Town and Country, Villari, Putnam's Sons.

German Life in Town and Country, Dawson, Putnam's Sons.

Turkish Life in Town and Country, Garnett, Putnam's Sons.

Belgian Life in Town and Country, Boulger, Putnam's Sons.

Swedish Life in Town and Country, von Heidenstan, Putnam's Sons.

Russian Life in Town and Country, Palmer, Putnam's Sons.

Dutch Life in Town and Country, Hough, Putnam's Sons.

Swiss Life in Town and Country, Story, Putnam's Sons.

Spanish Life in Town and Country, Higgin, Putnam's Sons.

Austro-Hungarian Life in Town and Country, Palmer, Putnam's Sons.

Danish Life in Town and Country, Brochner, Putnam's Sons.

French Life in Town and Country, Lynch, Putnam's Sons.

Stanford's Compendium of Geography:

Africa, 2 Vol., A. H. Keane, Stanford, London.

Asia, 2 Vol., A. H. Keane, Stanford, London.

Australasia, Vol. I, A. R. Wallace, Stanford, London.

Vol. II, F. H. H. Guillemard, Stanford, London.

North America, Vol. I, S. E. Dawson, Stanford, London.

Vol. II, H. Gannett, Stanford, London.

- Central and South America, 2 Vols., A. H. Keane, Stanford, London.
Europe, 2 Vols., G. G. Chisholm, Stanford, London.
A Glossary of Geographical and Topographical Terms, A. Knox,
Stanford, London.
Britain and the British Seas, H. J. Mackinder, Appleton.
The Nearer East, D. G. Hogarth, Appleton.
Central Europe, J. Partsch, Appleton.
North America, I. C. Russell, Appleton.
International Geography, H. R. Mill, Appleton.
Lakes of North America, I. C. Russell, Ginn & Company.
Rivers of North America, I. C. Russell, Putnam's Sons.
Glaciers of North America, I. C. Russell, Ginn & Company.
American History and its Geographical Conditions, E. C. Semple,
Houghton, Mifflin & Co.
Geographical Influences in American History, A. P. Brigham, Ginn
& Company.
The Earth and Man, A. Guyot, Chas. Scribner's Sons.
Ethnology, A. H. Keane, Cambridge University Press.
Elementary Meteorology, F. Waldo, American Book Co.
Junior Geography, A. J. Herbertson, Clarendon Press, Oxford.
Physical Geography of New York State, R. S. Tarr, The Macmillan
Company.
Elementary Meteorology, W. M. Davis, Ginn & Company.
National Geographical Monographs. Physiography of the United
States, American Book Co.

REFERENCE BOOKS FOR PUPILS

- Black's School Geographies, 9 Books, L. W. Lyde, A. & C. Black, London.
Black's Descriptive Geographies, F. D. & A. J. Herbertson, A. & C. Black,
London.
A Reader in Physical Geography, R. E. Dodge, Longmans, Green & Co.
Uncle Robert's Geography, 4 Vols., Parker & Helm, Appleton.
Playtime and Seedtime.
On the Farm.
Uncle Robert's Visit.
A River Journey.
The Story of Geographical Discovery, J. Jacobs, G. Newnes, London.
The Story of the Atmosphere, D. Archibald, G. Newnes, London.
Home Reading Geographies, About the Weather, M. W. Harrington,
Appleton.
How We Are Fed, J. F. Chamberlain, The Macmillan Company.

- How We Are Clothed, J. F. Chamberlain, The Macmillan Company.
How We Are Sheltered, J. F. Chamberlain, The Macmillan Company.
Picturesque Geographical Readers, 6 Books, C. F. King, Lee & Shepard, Boston.
Geographical Series, 5 Vols., Longmans, Green & Co.
Longmans' Geographical Reader for South Africa, Longmans, Green & Co.
The South American Republics, Markwick & Smith, Silver, Burdette & Co.
Australia and the Islands of the Sea, Kellogg, Silver, Burdette & Co.
Views in Africa, Badlam, Silver, Burdette & Co.
Life in Asia, Smith, Silver, Burdette & Co.
Modern Europe, Coe, Silver, Burdette & Co.
Life in Asia, Smith, Silver, Burdette & Co.
Carpenter's Geographical Readers, 6 books, American Book Co.
Around the World in the Sloop "Spray," Capt. Joshua Slocum, Chas. Scribner's Sons.
American Indians, F. Starr, D. C. Heath & Co.
Strange Peoples, F. Starr, D. C. Heath & Co.
Appleton's Lessons in Geography for Little Readers, American Book Co.
Geography Primer, Cornman & Gerson, Hinds, Noble & Eldredge.
Longmans' Pictorial Geographical Readers, Longmans, Green & Co.
Two Girls in China, M. H. Krout, American Book Co.
Five Little Strangers, J. A. Schwartz, American Book Co.
Alice's Visit to the Hawaiian Islands, M. H. Krout, American Book Co.
Big People and Little People of Other Lands, E. R. Shaw, American Book Co.
Man and His Markets, L. W. Lyde, The Macmillan Company.
Around the World, 3 Vols., S. W. & C. F. Carroll, The Morse Company.
Youth's Companion Series, Ginn & Company.
Triumphs of Science, M. A. L. Lane.
Northern Europe.
The Wide World.
Toward the Rising Sun.
Strange Lands Near Home.
Under Sunny Skies.
Home Geography, C. C. Long, American Book Co.
The Frozen North, E. Horton, D. C. Heath & Co.
Fridtzof Nansen, J. B. Bull, D. C. Heath & Co.
Geographical Nature Study, F. O. Payne, American Book Co.

- Geography for Young Folks, W. G. Baker, Educational Publishing Co.
Home Geography of New York City, Strabenmuller, Ginn & Co.
Geography of Commerce & Industry, Rochleau, Educational Publishing Company.
Guyot Geographical Reader & Primer, M. H. S. Pratt, American Book Company.
The Philippines, S. MacClintock, American Book Co.
Geography of New York. The State. The City. Smith & Perry, American Book Company.
Dutton's World at Work Series,
 In Field and Pasture, M. B. Dutton, American Book Company.
 Fishing and Hunting, Motte & Dutton, American Book Company.
Seven Little Sisters, J. Andrews, Ginn & Company.
The Story of Our Continent, N. S. Shaler, Ginn & Company.
Home Geography for Primary Grades, H. W. Fairbanks, Educational Publishing Co.
Great American Industries, A. Flanagan & Co.
 Minerals, W. F. Rocheleau.
 Products of the Soil, W. F. Rocheleau.
 Manufactures, W. F. Rocheleau.
INSTRUMENTS FOR STUDY OF MATHEMATICAL GEOGRAPHY AND CLIMATE
Heliodon, Central Scientific Company, Chicago.
Sun Board, J. P. Goode, Central Scientific Company, Chicago.
Sun Dial, Central Scientific Company, Chicago.
Season Apparatus, J. L. Hammett Co.
Planetarium, Lang Planetarium Co., Chicago.

In addition exhibit was made of the more generally useful recent publications of the U. S. Geological Survey, including monographs, Geology Folios, Bulletins and Maps, and several special pieces of homemade apparatus for use in schoolroom.

THE USE OF REFERENCE BOOKS IN SCHOOLS

One of the most valuable parts of geography training is the ability to use reference books accurately, easily and effectively. This training can readily be given through the use of reference books accessible in the school library. Only the best reference volumes should be used, and the best should be selected not merely because they are interesting but primarily because they are geographically sound, information giving, and really supplementary to the class-room lessons.

PHYSIOGRAPHY OF NEW MEXICO

BY CHARLES R. KEYES
Socorro, N. Mex.

NEW Mexican physiography is remarkable because of its peculiar types and its wealth of detail. Lying within the semi-arid belt, geologic processes have operated in a manner entirely unknown in eastern United States. Nowhere else in the country do so many distinct geologic provinces meet.

GENERAL CONSIDERATIONS

The area of New Mexico embraces 122,580 square miles. In extent it is about equal to the combined areas of the six New England states, New York and New Jersey. The extreme points are about 560 miles apart; or a distance equal to that between New York and Cincinnati, or between Chicago and Washington.

New Mexico belongs to a part of the United States that is historically of great interest. Its northeastern part was included in the Louisiana Purchase from France in 1803. The eastern half was annexed to the United States in 1845 as a portion of Texas. Most of the western half was ceded by Mexico in 1848. A small part of the extreme southwest was included in the Gadsden Purchase in 1853.

New Mexico rests on the backbone of the American continent. From the north extends southward into its boundaries the lofty Rocky range. In the west are the extensive and rugged Mogollon mountains. Through the central portion are numerous high block-ridges rising 3,000 to 5,000 feet above the surrounding country. Over the entire area are scattered volcanic piles, some of which are the most remarkable eruptive phenomena on the continent. Yet, among all these varied features the most dominant feature of surface relief in New Mexico is the plain.

GEOGRAPHIC PROVINCES

Main Characters. The newer geographic descriptions of regions do not take into account the colloquial districts which ordinarily are arbitrary sub-divisions, often with only vaguely defined boundaries. On the other hand, attempt is made to differentiate natural units having for their foundation distinctive physical features. Thus understood, a geographic province has certain characteristics of general surface relief, geologic formation, geotectonic arrangement, drainage features, climatic conditions, soil character, plant growth, economic resources, and harmonious environment for human habitation, that have unity and close relationships among them-

selves, and that contrast strikingly with similar natural features possessed by neighboring provinces.

New Mexico presents four such natural provinces, all of which have more or less sharply defined boundaries according to the criteria already set forth. These great geographic provinces may be named as follows: (1) the Great Plains Province, occupying the eastern part of the region, east of the Pecos river; (2) the Rocky Mountain Province, reaching southward from Colorado in a long narrow tongue to the Glorietta pass; (3) the Mexican Tableland Province, in the south-central part; and (4) the High Plateau Region including all of the northwest.

These provinces are outlined in the accompanying cut.

Great Plains Province. The vast level plains which stretch out eastwardly from the Rocky Mountain front to the Missouri river, extend southward into Texas nearly to the Rio Grande. Of this broad plains region only a comparatively small portion is represented within the limits of New Mexico. The Llano Estacado and the plains to the north, across the Canadian river, constitute the westernmost extension of the Great Plains. This province comprises all of eastern New Mexico east of the Pecos river.

Genetically the intermontane plains of the Mexican Plateau properly belong to the same topographic feature, but for reasons hereafter stated, these are best considered in connection with the description of that district. While the two provinces were once continuous they have of late become separated by the gouging out of the great Pecos and Canadian valleys.

That part of the Great Plains which lies in New Mexico is a high, flat tableland which is inclined slightly to the southeast. It is apparently level and even as far as the eye can reach. Without trees and sparsely covered by gray grasses it presents the appearance of a vast desert, yet supplies pasturage for countless cattle and sheep. At the eastern margin of this province the elevation above the sea is about 5,000 feet, and the seaward inclination is between 8 to 10 feet to the mile.

With the exception of the valleys of the Canadian river and the Rio Pecos, the Great Plains province in New Mexico is unfurrowed by drainage-ways of any consequence. Where these two rivers traverse the province, deep valleys are hollowed out. Prominent escarpments form the sides of these valleys, and the plains surface comes to the very brink of the trough or canyon.

Rocky Mountain Province. The Rocky mountains end in northern New Mexico. Lofty ranges continue southward over the southern Colorado line. Southward the final expression is a pitching anticline which takes the last range beneath the level of the Mexican plateau. As in

Colorado, the Front range is bordered by foot-hills of the "hogback" type, formed by the upturned edges of hard sandstone layers along a profound faultline. The shape of this province in New Mexico is that of a broad wedge with the sharp end at the Glorietta pass.

The peaks of this province rise to an elevation of 13,000 feet. In the



heart of these mountains the Rio Pecos takes its rise. Before it leaves the province the stream cuts a deep valley, the western side of which is the magnificent Glorietta escarpment.

Mexican Table Land Province. This province embraces a large part of central and southern New Mexico. In the southwest it extends over the continental divide. The distinguishing features of the region are the vast, even tableland and the block-mountain ranges which rise 3,000 to 5,000 feet above the plains at the base and from 8,000 to 12,000 feet above tide-

level. These tilted piles of strata resemble, on a huge scale, ice-blocks in a river during the breaking-up in the spring.

To such intermontane plains the Spaniards early gave the name "Bolson," meaning purse. Most of the bolsons have no water-courses traversing them. The intermittent brooks and freshet torrents which come down from the mountains soon lose themselves in the porous soils and unconsolidated surface deposits.

Only a single through-flowing river traverses the region. This is the Rio Grande, which has completely destroyed the line of bolsons through which it flows. It now occupies a channel 1,000 to 2,000 feet below the original level of bolsons on either side. The broad valley has a diversified topography which is peculiarly its own.

High Plateau Province. The northwestern and western parts of New Mexico belong to the High Plateau region, which also embraces northern Arizona, southeastern Utah, and southwestern Colorado. In the main, the surface is a vast elevated plain, over which are scattered many volcanic hills and mountains. The continental divide passes through the central part of the New Mexican portion of the province. In its small features the whole country is fully as rugged as any mountain district, but of a very different type. In general, the entire region is a series of gigantic steps formed by the hard layers of slightly tilted strata. This rough surface is channeled by numerous canyons.

PLAINS OF NEW MEXICO

The foundation of the most characteristic feature of the New Mexican region is believed to be a general plain of degradation worn out on the beveled edges of the rock layers, and inclined slightly to the seaward. The period of the last great erosion was probably Mid-Tertiary or Miocene or possibly as early as Eocene.

As they exist at present there are four principal classes of plains: Plateau plains, bolson or intermontane plains, river plains, and alluvial plains. Plains of the plateau type are easily recognizable as distinct levels. Above the surrounding country they rise by abrupt escarpments. A number of these levels are of wide extent. In the northeast the Mesa de Maya stands 3,000 feet above the Ocate mesa and the latter 500 feet above the Las Vegas plateau. The last is 2,000 to 3,000 feet above the present river beds.

The bolsons are large even-surfaced plains, the foundation of which is a planation surface on beveled strata, and which are floored with loose gravels, sands, and clays. These plains are uncut by water-ways. The drainage from the high, often mountainous periphery, is centrifugal. Evaporation is so great that lakes are rarely found in the centers.

River plains border the great through-flowing rivers which have furrowed out wide flat-bottomed valleys with high canyon walls. Below the level of these canyons the present streams have carved out much deeper channels with broad alluvial plains on either side. The fourth type of plains is the alluvial plain already mentioned.

MOUNTAIN SYSTEMS

If the plain is the dominant feature of the New Mexican region, the mountain is the most conspicuous relief feature. Of all, it is the one feature which usually attracts the greatest attention. Genetically no less than seven distinct types are represented: (1) The mountains of compression find only a single example—the Rocky mountains. (2) Mountains of erosion are best exemplified by the Raton range, in northeast New Mexico. (3) The magnificent Ortiz, Tueritos, San Ysidro, and Cerrillos groups are laccolitic in nature. (4) Block mountains, so characteristic of the Great Basin region, have the Sandia range for a type. (5) The Socorro mountain is an old Tertiary type of volcanic activity. (6) Isleta mountain is a low basaltic cone, a type which has many representatives in the region. (7) The Capulin mountain is a huge cinder cone rivaling that of Vesuvius and of very recent formation; it has a height of 3,000 feet above the surrounding plains.

These mountain ranges rise above the general plain, which itself is 4,000 to 7,000 feet above sea-level.

RIVERS OF NEW MEXICO

Main Features. The drainage of the semi-arid region is wholly unlike anything that is found in more humid regions. That of New Mexico is one of the most remarkable known. Most of the precipitation sinks into the porous soil, and never reaches the large streamways.

The principal waterways are of three kinds. Their waters may be continuous, as in the case of most rivers, or they may be interrupted, or they may be intermittent.

On the whole the drainage is in a nascent stage. In a physiographic sense even the through-flowing streams are consequent rivers. In the bolson plains there are no permanent and distinct drainage-ways and the torrential waters flow down the slopes at the foot of the mountains in broad sheets.

Continuous Streams. Of the first class of drainage-ways are the Rio Grande, the Canadian, Pecos, and San Juan rivers. These are through-flowing rivers rising in the southern Rocky mountains. While these streams receive practically no additions from the tributaries in the country which they traverse, they have an interesting geological history. The huge

valleys which they occupy appear to be, at first sight, out of all proportion to their size, as they are usually seen. Their high gradients, however, enable them to carry enormous quantities of water when the snows are melting in the mountains. Their effective erosive power is further shown in the turbid character of their waters and the vast amounts of silt which they carry at all times. The valleys of these streams are among the most interesting known. They lie many hundreds of feet below the general level of the plains around.

Interrupted Streams. Many of the drainage-ways are in some places flowing streams and in other places they have dry channels for a considerable portion of the year, the waters flowing in the sands and gravels beneath. The Rio Galisteo, the Rio Puerco, and a large number of other drainage-ways are of this order.

Intermittent Streams. This class embraces a very large proportion of the minor water-ways. They carry considerable amounts of water during heavy local rain-falls but soon cease flowing when the precipitation ceases. They thus are sporadic torrential channels. Throughout the region they are termed "arroyos" or dry creeks. Their gradients are high and in times of flowage carry along enormous amounts of gravels, sands and clays.

Many arroyos leading down from the mountains flow for a considerable portion of the year but upon entering the plains with their porous soils soon sink from view and become "lost rivers."

LAKES

Climatic conditions are not favorable to the existence of large bodies of quiet waters. While the centrally depressed bolson plains would be, under ordinary circumstances, lake basins, the present relationships of precipitation and great evaporation are such that when bodies of water are found in them they are comparatively small in size.

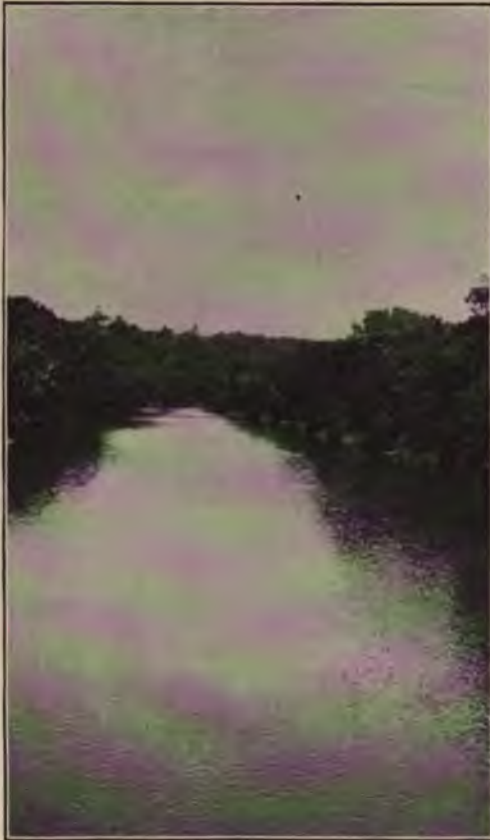
The lakes of the region are of two distinct types: mountain lakes and plain lakes. The latter are usually more or less temporary in character. There is also a class of lakes which occurs in connection with the bolsons that appears to have escaped the notice of writers on the region. For want of a better title they have been called Ephemeral lakes. They originate under abnormal though frequently recurring conditions.

SPRINGS

The springs of New Mexico are numerous. Little need be said concerning them in the present connection as they are to receive special treatment shortly. Besides ordinary springs for domestic purposes there are many hot springs and mineral springs which are invaluable for medicinal purposes. Some of these already have a wide reputation for their curative qualities.

DESTRUCTIVE FARMING

BY G. E. FINCH
Marion, Iowa



View of Turkey river where trees bordering the stream have been spared*

THOUGH Iowa is a prairie state, there are timbered areas to the northeast and east of considerable size. Perhaps the tense of this statement ought to be changed, for Iowa has been as prodigal of her scanty forest resources as have the better timbered states to the east and north. It is my purpose to give some of the effects caused by the deforest-

*Photographs by the Author.

ing of a part of the Turkey River Valley situated in Fayette County in Northeastern Iowa.

The topography of this region is that of the rugged, driftless area. The stream has cut a trench to a depth of three hundred feet through limestone and shales. The bluffs bordering it are in double series, an inner and an outer system, due to the alternating hard and soft formations through which the stream has carved its valley. These bluffs are mantled with loess, the well-known æolian deposit of friable yellow clay. The river bottom averages a half mile or more in width and is composed of two



Cultivated bottom lands along the river

parts, a flood plain and a terrace, the latter a relic of the high water attending the melting of an ice sheet of the glacial age at the head of the river valley.

All these formations, loess-covered hills, terraces and flood plains, originally supported a heavy growth of the finest forest trees, such as the sugar maple, hickory, black walnut, linden, elm and several varieties of oak. Prior to the white man's coming there were occasional openings on the river bottoms that furnished a rank growth of "blue joint," but the hills were almost entirely forested. Two impervious shale formations, one above and one below the inner range of hills, furnish numerous springs. The river has a fall through this region of about eight feet to the mile, so that with a fair chance it can keep its bed well cleared of the finer detritus. Where the river swings clear to the edge of its flood plain, rock escarpments

of considerable height are exposed. All these features combine to make a valley which for scenery would not be a discredit to a state more pretentious along these lines than Iowa.

THE WORK OF THE WHITE MAN

Now as to the work done by civilized man in this valley. His occupation began about 1850. His first task was to clear the bottom lands; and the fine farms found there, with bounteous crops and thriving herds, go far to reconcile one to the destruction of the majestic groves. When the lands along the river had been reduced to cultivation the next lands to be



Clearing in progress on a steep slope. Not even a sapling or bush spared cleared were those on top of the inner and outer ranges of bluffs. Both these regions are rolling, the former especially so. Still the loess soil is very fertile and better adapted to all sorts of seasons than the glacial soils of the county, so that these sections where not too rolling have produced a fair share of excellent farms. The clearing of these lands left only the steep faces of the two systems of bluffs still uncleared, and in recent years the forests there also have been largely cut away. If the land proved entirely too steep for tillage it was used for pasturage. One would have supposed that the owners would have spared the timber on the steep slopes at least, but the people have formed the habit of clearing off the forests, and besides, the price of wood and farm lands, too, kept getting higher and higher. Besides, had not the fathers of these forest destroyers, in Ohio and Indiana, girdled the finest forest trees, or cut and piled them in huge windrows and burned them in order to clear the land?

RESULTS OF THE DEFORESTING

We will now notice some of the immediate effects of the clearing of the forests, beginning with the farms on the hills. After a few years of cultivation—years of handsome returns at first, too—the humus in the soil had largely disappeared and the tree roots rotted. Then the washing of ditches on the slopes began. Perhaps the first one started in an insignificant way in a furrow left by the plow, or between the rows in a cornfield, or down the wheel tracks where the farmer drove through his field. However it may start, when gullying begins on loess slopes of steep gradient, the process goes on until bed rock or base level is reached. The ditches



View over the hill tops showing how far the clearing has advanced

usually wash two or three feet deep the first year, but they continue to enlarge year after year until they are sometimes twelve or fifteen feet deep and as many feet in width. A man may take care to prevent ditches from starting in his own land, but a careless neighbor down the slope allows one to start below him that works its irresistible way up through his field. Often they branch out and sub-divide until they seem to occupy an entire field. Where lands are thus ditched they are no longer cultivable with modern farm machinery. The soil deteriorates greatly in fertility, too, from leaching and wearing away of its surface. Fields like these yield a smaller income per acre than can be obtained from the wooded lands where the timber is cut just rapidly enough to keep pace with its growth, and they would not sell for half the price of timber lands covered with "second

growth." Owners of the gullied lands are glad to take twenty dollars an acre for them as against an average value of farm lands in the county of probably three times that amount.

The ruinous effects wrought on the hillside farms are little more dis-



A fully developed ditch. It has cut down to bed rock and has sent out numerous side branches

astrous than on the river-bottom lands. With every large storm the lands along the river are flooded and crops in their season washed out by the torrents which pour down the denuded slopes so fast as to cause the river to burst its bounds. The bottom lands are subject to all the caprices of floods. They may have their soil washed away or buried under a three-foot layer of mud; or in a single storm a fertile field may be changed to a

barren, sandy or rocky waste, uncultivable for years. Again the river or some tributary may change its course and undermine and carry away large amounts of valuable land. The river terraces, too high to be subject to overflow, are injured less, but they too are gullied or covered with the outwash from the ditches on the hillsides above. Timbered hills and



A ditch washed in the loess during the spring and summer of 1905

slopes to hold the water after a storm and to prevent the washing of detritus from the hills down upon the bottoms would prevent these ruinous effects.

Along with the deterioration of the land we find the river itself losing its charm. Its bordering fringe of native trees and grasses has nearly dis-

appeared. The farmer clears the land and plants his crops to the river's very brink. But the floods come and sweep away the crops and in their place sow the seeds of the rankest weeds and of the willow and cottonwood. These mongrel growths speedily monopolize any tract where given a foothold. They now occur nearly everywhere along the river, radically changing its appearance. Often acres are occupied by them in a single spot. The river no longer ripples in a limpid stream over beds of gravel and rock. Its channel is now silted up so that it is becoming a sluggish, dirty stream.

The thought of all this marring of the handiwork of nature at the hand



Another view of Turkey river. On the farther bank the native forest has been spared including two white pines. But observe how a fringe of weeds and willows is spoiling a magnificent rocky bank

of civilized man is almost enough to make one wish that these beautiful lands might have remained in the possession of the Indian. But the residents of this valley must not be singled out for especial criticism. There are some few who have carefully preserved goodly forests for use and beauty. Others have planted trees extensively. At the worst, the most reckless destroyers of forests among them can refer for endorsement to a National Government that seems determined to maintain a tariff on Canadian lumber until every native grove in the United States has disappeared.

THE REMEDY

What is to be done in such a case? The damage, though great, is not

irreparable. The high price of wood and lumber is compelling people to appreciate their forests as never before. Let the press and the school teach the principles of forestry and the love of nature and its beauties. Let the trees be restored to the hillsides and to the gullied lands by protecting all the efforts of nature and by replanting. Americans are surely too intel-



A cut-over hillside where the owner very wisely is
allowing the timber a chance to grow up again

ligent to be permanently wasteful of their timbered wealth. If crowded Germany and France can spare land for trees to grow, and if they can teach their people how to grow them, surely as much can be done in America.

THE GEOGRAPHY COURSE IN THE OSWEGO STATE NORMAL AND TRAINING SCHOOL

BY AMOS W. FARNHAM
Oswego, N. Y.

PART V

THE WORK OF THE GRADES (Concluded)

Sixth Grade: Africa, Australia, South America and second treatment of North America

A. Africa.

- I. Location. Locate Africa on the globe. A small globe on the desk of each pupil. Note that the equator passes through Central Africa and the Amazon Valley; that the parallel that passes through South Africa passes through La Plata Valley; and that the parallel that passes through North Africa passes through Virginia, Kansas, and California.

Note.—That the Atlantic Ocean is between Africa and the Americas.

In what great heat belts (zones) that encircle the earth is Africa? Study latitudinal climate with reference to temperature.

Locate Africa on Mercator's map of the world. What bodies of water almost surround it? (In bounding begin at the North and proceed clockwise.)

- II. Form. What great land masses (continents) is Africa nearest like in form? What geometric form does Africa approach? In what heat belt is its broadest part? Its narrowest part?
- III. Size. What continents are larger than Africa? What ones are smaller?
- IV. Relief. (The elevations and surface undulations of a country. —*Guyot.*)

Study relief map of Africa.

1. Highlands.

- a. Plateaus. The great bulk of the continent is made up of plateau lands.

(1) Abyssinian plateau. The most important highland of all Africa.

(a) Location.

- (b) Height. Nearly 8,000 feet above sea level. Some old volcanic cones attain a height of 16,000 feet.
 - (c) Area.
- b. Mountains. A marked absence of mountain ranges.
 - (1) Atlas mountains. The one important mountain range.
 - (a) Location.
 - (b) Trend.
 - (c) Height. In western half the greatest height exceeds 14,000 feet.
 - (d) Slopes. Southern slopes very abrupt; northern slopes somewhat gentle.
 - (2) Drakensberg Range. Highest peak 11,000 feet.
 - (a) Location.
 - (b) Trend.
- c. Mountain peaks. Old volcanic cones.
Kilimanjaro, highest peak, 19,200 feet; Kenia, 18,000 feet; Ruwenzori, 16,000 feet. Location of each.
- 2. Lowlands. Only a narrow fringe of low land which generally borders the plateau escarpments, although in places the highlands rise almost abruptly from the sea.
"Drawing a curve from the coast of the Red Sea in the east to the head of the Gulf of Guinea in the west, we may say that whereas land over 2,000 feet above the sea is the exception in the north, to the south it is the exception to find land below that elevation except close to the coasts."—*The International Geography*, p. 890.
N. B.—Note relation of altitude to temperature and rainfall.
- 3. The Great Rift Valley.
Location, origin, description.
Lake Tanganyika and Lake Nyassa lie in a portion of this valley.
- V. Drainage—dependent on relief.
 - 1. Mediterranean drainage.
 - a. The Nile River. Rises three degrees south of the equator, flows through Lake Victoria, receives the drainage of Lake Albert, is joined at Khartum by its

most important tributary, the Blue Nile, and still further north, 180 miles, by its last tributary, the Atbara. From this point to the sea, 1,800 miles, it flows on without receiving a single tributary.

(1) Location. The Nile River carefully traced from source to mouth.

(2) Length, 4,000 miles.

(3) Breadth. Normal maximum breadth below Khartum does not exceed 3,300 feet; at flood time maximum breadth does not exceed nine miles at any point.

(4) Navigability. Cataracts located.

(5) The Nile floods.

Time of occurrence, causes, effects. "Egypt the gift of the Nile."

(6) Distributaries.

The Rosetta and Damietta branches.

(7) The Nile delta.

Form, area, origin, habitability. The alluvium of the Nile Valley is a contribution from the Abyssinian plateau.

(8) The Nile Valley.

From the point of confluence of the Atbara with the Nile onward to the apex of the delta, the Nile Valley reaches its maximum breadth in Egypt proper, in places being over 30 miles in breadth. This part of the "Valley is simply a cleft (rift) in the desert plateau, the cliffs on both sides of its alluvial plain rising in many cases to a height of over a thousand feet."

What isotherms for January cross the Nile Valley? What ones for July? See *Longmans' New School Atlas*.

(9) Locate Rosetta, Damietta, Alexandria, Port Said, Cairo, Assuan (Old Syene), Khartum, and give reasons for location of each. What are the great industries of the Nile Valley? What are the principal products? Children use the maps,

pictures, and text of their geographies that relate to the Nile Valley.

Read gazetteer and encyclopaedia articles regarding each.

Review of the Nile Valley in the lecture room with stereopticon slides.

2. Indian Ocean drainage.

- a. Zambesi River. Location, length, Victoria Falls, navigability, delta, and valley treated similar to Nile features.

Locate Quilimane. Between what isotherms for January is the Zambesi Valley? Between what for July? What products of export come from the Zambesi Valley?

- b. Limpopo River.

(1) Location.

(2) Length, 900 miles.

3. Atlantic Ocean drainage.

- a. Orange River. Chief river of Southern Africa. Length, 1,200 miles. The Vaal is the chief tributary. The Orange River is "not much better than a huge torrent."

What isotherm crosses the Orange River Valley in January? Between what isotherms in July?

What are the great industries of South Africa? What are the important products?

- b. Congo River. Location, length (3,000 miles), Navigability (Stanley Falls and Stanley Pool). The Congo is only second to the Amazon in volume, and among African rivers next to the Nile in length.

Note the industries and products of the Congo Valley. Read Livingstone's, Cameron's, and Stanley's explorations of the Congo.

- c. Niger River. Location, length (2,600 miles), delta. Locate Bonny (Idzo).

Between what isotherms for January is all of the Congo Valley and the most of the Niger Valley?

What isotherm crosses each in July?

VI. Arid regions.

1. The Sahara. The largest desert in the world.
 - a. Boundary: Extends from the Atlantic Ocean to the Nile Valley; and from the Atlas mountains and their eastern continuations to varying, hence vague, southern limits. The Sahara includes the Libyan desert.
 - b. Surface: Plateaus, mountain ranges, dunes, oases. Study the oases of Fezzan and Air. What is the chief product of the oases? Note that the Tropic of Cancer divides the Sahara into two nearly equal parts.
2. The Kalahari. Location. Note that the Tropic of Capricorn divides the Kalahari into two nearly equal parts.

N. B. Half way between these two great arid regions is the equatorial rain belt which includes the greater portion of the Congo basin and the northern coast of the Gulf of Guinea where are found the great forests of Africa.

For the month of January what isotherms cross the Sahara? What ones cross the Kalahari? Between what two is the equatorial rain belt? What isotherms for July cross these regions?

VII. Coast-line.

1. Conspicuous for absence of deep indentations (gulfs and bays), and therefore for marked land projections (peninsulas). The greatest projection on the Mediterranean coast is caused by the eastern extension of the Atlas mountains into the sea. The greatest indentations are the gulfs of Cades and Sidra.

On the Indian coast locate the projection that terminates in Cape Guardafui, and Delagoa Bay.

On the Atlantic coast locate Cape of Good Hope, Bight of Biafra, Cape Verde, South Cape Blanco and Cape Blanco. Compare the coast-line of Africa with that of Eurasia; with that of North America.

Note that the sea projecting its arms into a great land mass brings a much greater area of that land mass under the influence of oceanic climate; thus reducing the heat of summer and the cold of winter. Note that the heads of bays and gulfs usually furnish excellent harbors and hence favor commerce.

Long narrow bays reduce distances to the sea, and in many cases do away with any considerable land transportation. Commerce is a great civilizing agency. With the exchange of commodities takes place an exchange of ideas.

Locate Suez, Gulf of Suez and the Suez Canal; Zanzibar Island and Zanzibar; Mozambique, Madagascar Island and Mozambique Channel; Delagoa Bay and Lorenzo Marques (the terminus of a railway connecting the Transvaal with the seaboard); Port Elizabeth and Algoa Bay; Cape Town and Table Bay; Monrovia, Freetown and Sierra Leone River; Morocco, Tangier, Algiers, Tunis, and Tripoli. In South Africa locate Johannesburg (gold fields), Kimberley (connected by railway with Cape Town), and Pretoria.

Cairo is the largest of African cities, being as large as Boston; Alexandria next in size is about as large as Pittsburgh; Tunis is somewhat larger than Denver; Johannesburg exceeds Omaha; Algiers exceeds Nashville; Cape Town equals Wilkesbarre; Morocco has the same number of inhabitants as Portland, Me. The other cities each have less than 50,000 inhabitants. The oldest and largest cities are on the Mediterranean coast and in the Nile Valley. Why?

For what commodity of commerce is each city noted?

VIII. Means of communication.

1. Submarine cable loops that surround the continent.
2. Cape-Cairo telegraph line, and many other shorter lines.
3. Cape-Cairo railroad (not completed). Many short lines in both North and South Africa.
4. Suez Canal.
5. Coast steamers.
6. River steamers.
7. Caravans whose routes connect coast cities with the interior, especially with the oases.

IX. Political divisions of Africa. European "spheres of influence."

N.B.—Outline maps of Africa "edited" by pupils.

B. Australia.

I. Location: Latitudinal, longitudinal, climatic.

Note that the Tropic of Capricorn crosses Australia. In what part? In what heat belts is Australia?

- II. Size. Compare with each continent studied.
- III. Relief.
- IV. Drainage.
- V. Arid regions.
- VI. Coast-line. Great Barrier Reef.
 - 1. Gulfs, bays, peninsulas, capes, islands.
 - 2. Continental shelf. Extent.
 - 3. Coast cities located.
 - a. Their size and commercial importance.
- VII. Great industries. Exports. Note the plants and animals that are peculiar to Australia.
- VIII. Means of communication and transportation.
- IX. Political divisions of Australia.

For fuller method of treatment, see outline work on Africa.

Study New Zealand; location, climate, relief, industries, products (agricultural, grazing, mining).
- C. South America.
 - I. Location. Locate South America on the globe. A small globe on the desk of each pupil. Note that the equator passes through the mouth of the Amazon River on the east, and the City of Quito on the west. The equator passes also through the central part of Africa, crossing the meridian of Greenwich in the Gulf of Guinea. Note that the Tropic of Capricorn crosses the (nearly) central part of South America, the southern part of Africa, the island of Madagascar, and the continent of Australia. In what heat belts is South America?

Locate South America on Mercator's map of the world.

What bodies of water almost surround it? Note the Isthmus of Panama. What continents does it connect? What waters does it separate?
 - II. Form. Compare with Africa and North America. What geometric form does South America resemble? In what heat belt is its broadest part? Its narrowest part?
 - III. Size. What continents are larger than South America? What ones are smaller? Name all the continents in the order of size, naming largest first.
 - IV. Climate. Study relief map of South America.
 - 1. Equatorial Calm Belt (Doldrums).

- a. Location.
- b. Temperature.
- c. Direction of atmospheric current.
- d. Rainfall.
- e. Extent and migration.
2. Trade-wind belts.
Location, temperature, direction, moisture, velocity. Extent and migration of trade-wind belts.
3. Calms of Capricorn (horse latitudes).
Location, temperature, direction of atmospheric current, relation to rainfall, extent, migration.
4. Northwest anti-trades ("Brave west winds").
Location, temperature, direction, force, relation to rainfall, extent, migration.

V. Relief.

1. Primary highlands.
 - a. Andes mountains.
 - (1) Location.
 - (2) Direction of trend.
 - (3) Extent, length, width, height.
 - b. Bolivian plateau.
Location, area, height.
2. Secondary highlands.
 - a. Location—Guiana, Brazil.
 - b. Direction of trend.
 - c. Extent, height.
3. Mountain peaks.
Aconcagua, 22,860 feet.
Sorata, 21,500 feet.
Chimborazo, 20,500 feet.
Cotopaxi (highest known volcano), 19,613 feet.
4. Lowlands: The great river valley.

VI. Rainfall. See rainfall map to learn general distribution.

1. Compare rainfall of trade-wind and doldrum belts; compare these belts with belt of "brave west winds."
2. Compare eastern and western coasts and each with interior.
3. Compare highlands and lowlands.
4. Compare windward and leeward mountain slopes in trade wind belt and "brave west wind" belt.

5. Note change of climate of that region of country traversed by both migrating doldrums and trades.

VII. Drainage—dependent on relief.

1. Atlantic drainage.

- a. Magdalena River.

- (1) Location. Traced from source to mouth.
 - (2) Length, 1,050 miles.
 - (3) Navigability (620 miles).
 - (4) Delta.
 - (5) Chief tributary, the Cauca.
 - (6) Magdalena Valley.

Locate Cartagena (12,000 pop.).

- b. Orinoco River.

- (1) Location.
 - (2) Length, 1,350 miles. Carefully traced.
 - (3) Navigability—Orinoco Falls (Rapids of Atures).
 - (4) Delta.
 - (5) The tributary Cassiquiare; note its peculiar relation to the Rio Negro, hence to the Amazon.
 - (6) Orinoco Valley.
 - (a) Llanos region.
 - (b) Forest region.
 - (7) Locate Caracas.

- c. Amazon River (largest river of the world).

- (1) Location. The trunk stream and tributaries carefully traced.
 - (2) Length, 3,300 miles (statistics vary).
 - (3) Navigability (2,200 miles for steamships).
 - (4) Mouth, 50 miles wide.
 - (5) Marajo Island.
 - (6) Amazon Valley.
 - (a) Selvas. Products.

- d. Para River.

Physically the estuary of the Tocantins. Sometimes regarded as one of the mouths of the Amazon. Forty miles wide where it enters the Atlantic.

- (1) Locate Para (65,000 pop.).

The center of the river trade of the Amazon system. (Rubber, nuts, hides.)

c. La Plata River System.

Uruguay, Parana, Paraguay Rivers.

(1) Location. System carefully traced.

(2) Length.

(3) Navigability.

(4) La Plata Valley.

(a) Pampas. Products.

(5) Locate,—

Buenos Aires, (560,000).

Montevideo (240,000).

Rosario (95,000).

La Plata (70,000).

Cordova (36,000).

Santa Fe (36,000).

Asuncion (35,000).

N.B.—Account for so many population centers in La Plata Valley and absence of them in Amazon Valley.

2. Pacific drainage.

Account for the absence of large rivers on the Pacific coast.

What is the comparative velocity of its streams?

VIII. Arid regions.

1. Desert of Atacama (Nitrate of Soda).

2. Shingle desert.

Note.—In what wind belt is each? Then account for their being on opposite sides of the Andes.

IX. Coast-line.

Locate Gulf of Darien, Cartagena Bay, Point Gallinas, Gulf and Lake of Maracaybo, Trinidad Island (Asphalt), Georgetown (54,000 pop.), Paramaribo (30,000 pop.), Cayenne (10,000 pop.), Marajo Island, Cape St. Roque, Pernambuco (150,000 pop.), Bahia (200,000 pop., account for this unusual size of a tropical city), Santos Bay and Santos (important coffee shipping point), Rio Janeiro (500,000 pop.; nearly one-half of the coffee consumed in the world is shipped from this point) and Rio de Janeiro Bay, Cape Frio, Montevideo, Buenos Aires, La Plata, Strait of Magellan, Falkland Islands, Tierra del Fuego Island, Cape Horn. (Note the great extent of continental shelf extending from the Atlantic coast and account for the sinuosity of that coast.)

Locate Chiloe Island, Concepcion (24,000), Santiago (19,000), Valpariso (105,000), Callao (36,000), Lima (104,000), Guayaquil (45,000), Gulf and River of Guayaquil, Quito (80,000), Gulf of Panama. (Note the well nigh absence of continental shelf on the Pacific coast and account for the regularity of that coast.)

- X. Great industries and export products: Agricultural, grazing, forest, and mining.

Note the plants and animals that are peculiar to South America.

- XI. Means of communication and transportation.

- XII. Political divisions of South America.

Outline maps of South America "edited" by the pupils.

- D. North America—Second treatment.

N.B.—In the second treatment of North America the emphasis is placed on the earth side, not losing sight of the life side. Here *causes* are first considered. The work is more intensive, the reasoning faculty being appealed to in a greater degree.

- I. Location: Use globes, large and individual, also Mercator's map of the world. Latitudinal and longitudinal; location with reference to hemispheres, zones, bordering oceans, and other continents.

- II. Form.

- III. Size: Compare with each of the other continents.

- IV. Relief.

1. Western highlands. Use relief maps of North America.

a. Mountain systems, ranges, noted peaks.

b. Plateaus.

2. Eastern highlands.

3. Lowlands.

a. Central plain.

b. Coastal plains.

- V. Drainage.

1. Arctic drainage.

a. Mackenzie River (2,000 miles). Flows to higher latitudes, hence to colder regions throughout its course and into Arctic waters. Its upper course frees itself from ice earlier in the spring than does its lower course, causing overflows and floods in its lower course. Therefore the Mackenzie and other rivers belonging

to the Arctic drainage have little commercial value.

To drain the land is their principal office.

2. Atlantic drainage.

a. St. Lawrence River.

b. Hudson River.

c. Mississippi River.

d. Many less important streams.

Note the relative commercial value of these rivers based on their latitude, direction of flow, length of their navigable waters, their relation to other bodies, and the character of the larger bodies into which they flow.

3. Pacific drainage.

a. Colorado River.

b. Sacramento—San Joaquin River.

c. Columbia River.

d. Yukon River.

Study the relation of these rivers to commerce.

4. Interior drainage.

Commercial and irrigation values.

VI. Climate, determined by,—

1. Latitude.

2. Prevailing winds.

3. Bodies of water.

4. Ocean currents.

Note temperature of each current (Gulf Stream, Labrador current, Japanese current) and direction of prevailing wind passing over them landward.

VII. Rainfall determined by,—

1. Prevailing winds.

2. Mountains and Plateaus.

3. Bodies of water.

VIII. Coast-line.

1. Compare different coasts with regard to direction, length, sinuosity; hence number of harbors, temperature of harbors in winter, nearness to foreign markets.

IX. Great industries determined by,—

Temperature, rainfall, soil, presence of forests, deposits of minerals, water-power, navigable waters.

X. Densely and sparsely settled regions and reasons therefor.

Study the greater Antilles, their location, size, relief, climate, principal products, and chief cities, noting the relation of Porto Rico and Cuba to our own government.

Seventh Grade: Detailed study of the United States. This is a somewhat exhaustive geographical study of our country which is considered to be of prime importance to intelligent, loyal citizens. Geographical reasons for the settlement and development of the various regions, for the origin and growth of cities, and for the commercial prosperity of our nation are carefully considered.

Eighth Grade: Second treatment of Eurasia and a series of lessons on the atmosphere and the ocean.

A. Eurasia. Treatment similar to second treatment of North America.

Study the East India Islands.

B. Lessons on the atmosphere and ocean.

Many pupils never go beyond the eighth grade, hence never receive formal instruction in any branch of physical geography. In preceding grades the work has been very largely confined to a study of the land. These lessons will interpret many phenomena which otherwise might never be explained.

EDITORIAL

EQUIPMENT FOR GEOGRAPHY TEACHING

THE Editor of the JOURNAL presents this month a somewhat lengthy list of equipment available for geography teaching in elementary and normal schools, with the thought that such a list will be helpful to teachers who need to know what is available, that they may not buy equipment unwisely. This list is not intended to be complete in any way but is presented as showing what may be easily secured through American publishers and map concerns.

The list is made up on the basis of an exhibition recently held at the Teachers College, and to which all the well known publishers and map houses were asked to contribute. The list therefore includes the larger part of the materials considered by the publishing houses as their best and most attractive products, and hence can be relied upon as fairly representative and complete within certain limits.

The equipment for high school work in physical geography has not been included because materials for that kind of work are definitely outlined in the leading text-books and in other sources of reference.

RECENT PUBLICATIONS

AN INTRODUCTION TO ASTRONOMY. By Forest Ray Moulton; pp. xviii+557. New York. The Macmillan Company, 1906.

A simple, well planned, graphically expressed and most helpful treatment of the elements of astronomy. Valuable to teachers of geography for its able presentation of many facts and principles necessary in geography. The chapters on the motions of the earth, time and tides are of special value to teachers of geography.

THE GEOGRAPHY AND GEOLOGY OF ALASKA, a summary of existing knowledge. By Alfred H. Brooks, Cleveland Abbe, Jr., and R. U. Goode. Professional Paper No. 45 of the United States Geological Survey, pp. 327. Washington, The Government Printing Office, 1906.

A study of the geography, history, geology, climate and topography of Alaska accompanied by numerous maps and illustrations and a large scale topographic map. Mr. Brooks, the chief author, is the leading authority on Alaska, and this report, written by him and his associates is the most authoritative account of Alaska extant.

PHILIP'S MODERN SCHOOL ATLAS OF COMPARATIVE GEOGRAPHY. Edited by George Philip, containing 136 maps and diagrams. London. George Philip & Son.

Contains numerous general world maps, a series of maps for each continent showing physical and political conditions, many larger scaled regional maps and smaller insets. The maps of Europe and the British Isles are especially full and valuable. The series devoted to the British Isles include a physical map, political map, a map showing agriculture, mining and fishing, one devoted to industries, one to languages and dialects, one to density of population, one to climate, one to geology, one to pastoral and agricultural regions, one to river basins and cotidal lines and eight special regional maps.

The maps are clear and usable, the book has an excellent index and deserves wide usage as a reference volume.

THE STORY OF RUSSIA. By A. Van Bergen; pp. 288. New York. The American Book Company, 1905.

An interesting, brief but evidently authoritative account of the geography and history of Russia accompanied by several maps and numerous illustrations.

NEWS ITEM

The JOURNAL notes with deep regret the death early in May of Professor Israel C. Russell, of the University of Michigan. Professor Russell, by his field work and explorations in the North West and in Alaska, and by his government reports and books, has done much for the cause of geography; and his volumes on the Lakes, Glaciers, Volcanoes and Rivers of North America, and his large volume on North America will long remain most necessary reference volumes for all teachers of geography.

NOTES

SOME NOTED IMPORTATIONS OF PLANTS.—The discovery of gold at Sutter's mill was the beginning of the great industrial development of the Pacific coast, but the introduction by the Catholic Fathers of a single forage plant—alfalfa—has turned two million acres of land into the most generally profitable farm area of this country.

These same Fathers brought with them to their missions olive cuttings, whose descendants to-day cover thousands of acres of the best tilled olive orchards in the world. A few orange cuttings from the east coast of Brazil, called to the attention of the world by an American woman, have grown until they number their descendants by millions and form what is one of the characteristic features of California—its orange groves.

The tomato, which before the war was a curiosity from Peru and was used to frighten slaves into obedience, because they thought it poisonous, was grown last year on over half a million acres of garden land.

The lima bean, whose arrival in this country no historian has considered worthy of chronicling, has so grown in importance since its introduction, some time about 1820, that to-day special freight rates are granted it between southern California and the Atlantic coast, and thousands of acres of land where the rainfall is extremely light are devoted almost exclusively to the cultivation of this Peruvian bean.

The potato from the highlands of Colombia and Peru; the rhubarb, from central Asia; the asparagus, from England, and even the celery of southern Europe, have all been, one after the other, introduced into our fields and gardens.

Though these great changes in the farm and garden areas of the country have been wrought in less than a lifetime, they have still been too slow, and to-day changes as far-reaching and important as the introduction of the olive or the orange are being brought about by government aid in a surprisingly short time.

—*National Geographic Magazine, April 1906.*

THE SMYRNA FIG.—One of the most fascinating events in the history of plant introduction was the introduction of the Smyrna fig industry. The Smyrna fig has always been considered the finest fig in the world, and beyond all competition; so it was natural that progressive Californians should wish to see if they could not grow it. Orchards were accordingly started in 1880. They grew well, but the crops of fruit they bore fell to

the ground when quite green, and it was evident that something was lacking to make the industry a success. A study of fig culture in Smyrna was made, and it was discovered that a process called caprification was necessary. This consisted in hanging in the trees of the true Smyrna fig the young fruits of another variety of figs that are not edible, but which contain thousands of microscopic wasp-like insects, called *Blastophaga*. These insects creep out of the caprifigs just at the time when the Smyrna figs are in bloom, and crawling into the latter, they fertilize the hundreds of small flowers of which the fig is composed, and instead of dropping off like unfertilized flowers, the Smyrna figs grow and ripen.

The caprifigs were accordingly imported as cuttings, but again the owner was disappointed when the trees bore, for it was discovered that they had left their tiny insects behind and were worthless. A final attempt was made through the combined efforts of the entomologist of the Department of Agriculture and Mr. W. T. Swingle, of the Bureau of Plant Industry, and in 1899, after nineteen years of effort, Mr. Roding's orchard of Smyrna figs was established. It is still the largest in this country and has been yielding large crops of delicious fruit. Sixty-five tons was the output for 1903, and though in its infancy, the California Smyrna fig industry is already supplying a portion of the figs now sold in our markets, and these are being put up with a cleanliness unknown in their native land.

—*National Geographic Magazine*, April 1906.

THE DATE PALM INDUSTRY.—The transfer from the great deserts of the old world to those of the new of the unique date industry is an accomplishment of which the government may well be proud. It is something that private enterprise would not have undertaken for decades to come, and the name of Mr. Walter T. Swingle will be always associated with this new industry. Though the attention of the public was first attracted to the possibilities of growing the foreign date palm in this country through chance seedlings that bore fruit, and through an early introduction of the pomologist of the department, it was the exploration trip of Mr. Swingle to the Desert of Sahara in 1899 that first proved the feasibility of starting commercial date plantations in Arizona and California. From the time when the first large shipment of palm suckers reached the Southwest until the present, the Office of Plant Introduction has had an explorer in some one or other of the great date regions of the old world gathering plants for the government plantations. To-day the list of introduced varieties numbers over 170, and more than 3,000 palms, large and small, have been imported and planted out. The best sorts from Egyptian

oases, selected kinds from the valley of the Tigris, the famous dates of southern Tunis and even the varieties from uncivilized Beluchistan, have been gathered into what can proudly be called the best collection of date varieties in the world. This search through the deserts of the world has revealed the fact that the dates of our markets are only one or two kinds of the host of sorts known to the true date eaters, the Arabs, and that those we prize as delicacies are by no means looked upon by the desert-dwellers as their best. The search has brought to light as well the hard, dry date, which Americans do not know at all, and which they will learn to appreciate as a food, just as the Arab has. Already Egyptian and Algerian imported palms have borne and ripened fruit, and many persons in close touch and sympathy with the work have sampled the first fruits of the newly introduced industry.

To all of us who have seen the date palm forests of the old world deserts and who have followed the progress of the experiments in this country, the landscape of the deserts of Arizona and California will not long be thought of without the presence of these stately plants that have so much that is biblical and ancient about them.

—*National Geographic Magazine, April 1906.*

THE NUMBER OF SHEEP AND THE PRODUCTION AND CONSUMPTION OF WOOL BY COUNTRIES.—Before agriculture was developed to any extent, sheep raising was followed by a large number of the dwellers in Asia and the more settled regions of the world. We read in Genesis that "Abel was a keeper of sheep" and that a large part of the wealth of the early patriarchs was made up of flocks of sheep.

The nature of sheep makes them capable of adapting themselves to different climates and conditions and well suited to the nomadic life common in many parts of Asia in earlier times. They supplied food and clothing to their owners and made a profitable return to the shepherd, the earliest and most honorable calling of man.

Sheep preceded civilization in many parts of the earth. Greece for many years was the sole possessor of sheep in Europe. They were introduced into Italy after the foundation of the Roman Empire and their conquests extended sheep raising to their colonies. Spain, which afforded abundance of pasture, had the honor of developing and improving its sheep, so that Spanish wool, even in Roman times, was famous for its quality. Pliny says that the finest wools in his time were obtained from Apulia on the Adriatic Sea.

Sheep in England date back to an early period. British wool was con-

sidered a luxury even in Rome itself. From the thirteenth to the fifteenth century, England had a remarkable monopoly of wool. This had the effect of retarding the progress of its manufacturing industries, England being then mainly a rural community.

Merino sheep were brought to America by the Spaniards, and other European breeds by the earlier settlers of the United States. After numerous attempts extending through many years and attended with great difficulty, merino sheep were introduced extensively into the United States.

In Australia, Argentine Republic, Uruguay and South Africa, the introduction of European breeds has made sheep husbandry the most important business in those countries and has enormously increased their flocks.

The number of sheep in the world is estimated at about 480,000,000.

The leading countries are given in the following table:

Millions of Sheep		Millions of Sheep	
Australasia	1905.....83	Spain	1900.....16
Argentine Republic.....	1905.....78	South Africa	1904.....14
Russia in Europe.....	1900.....50	Austria Hungary	1900.....11
United States	1905.....38	Germany	1905.....8
United Kingdom.....	1903.....30	Algeria	1901.....8
Russia in Asia.....	1900.....20	Bulgaria	1900.....7
France	1903.....19	Italy	1900.....7
India	1905.....18	Roumania	1900.....6
Uruguay	1904.....17	Mexico	1903.....4

In Australia the sheep are raised mainly on the grassy lands and drier downs south of the 20th parallel. In New Zealand the Canterbury plains in the middle island and the drier parts of the western mountains are the sheep raising regions. Australian wool is usually washed on the sheep runs and then forwarded to Sydney, Melbourne and other ports for export. In South Africa the grassy Karoos supply the needed pasture. In Argentina two-thirds of all the sheep are raised in the Province of Buenos Aires.

The merino sheep produces the finest wool, while cross breeds produce a coarser wool but are better for mutton. There has been a tendency of late in Australasia and the River Plate region, as well as other sheep countries, to breed sheep for the mutton. This is due to the adoption of refrigeration methods in transportation, enabling the carcass to be landed in Europe in good condition. There has been for years a steady decline in the number of sheep in the eastern part of the United States and in all European countries except Great Britain. This is due to the fact that agriculture is giving more profitable returns to farmers than sheep raising.—*Commercial America*.

CURRENT ARTICLES ON COMMERCE AND INDUSTRY.—

March:

Butter Producing Cows, The Jerseys, (Ill.) W. H. Dexter, *Farming*.

Child Labor, Laws Relating to, *Bull. of Bureau of Labor*, Jan.

Child Labor, The Cry of the Children, Mrs. John Van Vorst, *Sat. Evening Post*, March 10.

Coal and Iron, The World's Supply of, Cons. Gen. Mason, *Mo. Cons. and Trade Reports*.

Cochineal Insect, *Bull. of Bureau of Am. Republics*.

Cocoa Crops and Consumption, The World's, 1901-1904, *Bull. of Bureau of Am. Republics*.

Copper the Electric Metal, Chas. H. Cochrane, *Moody's Mag.*

Ireland, Deserted, (Ill.), P. F. Jones, *World To-Day*.

Jamaica, Captain Baker and, (Ill.), E. P. Lyle, Jr., *World's Work*.

Morocco, "The Land of the Extreme West" and the Story of My Captivity, (Ill.), Ion Perdicaris, *Nat'l. Geog. Mag.*

Russia's Great Resources, I. L. Lee, *Moody's Mag.*

Silk, Cultivation of in China, Cons. Haynes, *Mo. Cons. and Trade Reports*, Feb.

Slaughtering, The Packers and the People, J. Ogden Armour, *Sat. Evening Post*, March 3, 10, 24, 31.

Slaughtering, An Answer to Mr. Armour, John C. Scales, *Sat. Evening Post*, March 10.

Social Settlement, Fifteen Years at Hull House, (Ill.), Jane Addams, *Ladies' Home Journ.*

Speculation, Popular Fallacies of, Thos. Gibson, *Moody's Mag.*

Swine, The Possibilities of Breeding, A. J. Lovejoy, *Farming*.

Switzerland, Value of Geographical Position, *Mo. Cons. and Trade Reports*, Feb.

Texas and the Texans, (Ill.), M. G. Cuniff, *World's Work*.

April:

Alabama's Coal and Iron Industries, Thos. Gibson, *Moody's Mag.*

Botany, Our Plant Immigrants, (Ill.), David Fairchild, *Nat'l. Geog. Mag.*

Coal, The World's, *Moody's Mag.*

Consular Reform, C. A. Williams, *World To-Day*.

Cotton Culture, First Steps in, (Ill.), C. W. Burkett, *Farming*.

Forestry, A Country [China] That Has Used up Its Trees, (Ill.),

Eliot Blackwilder, *Outlook*, Mag. No.

Furniture, The Truth About, (Ill.), W. A. Dyer, *Country Life in Am.*

Furniture, The Quest of the Colonial, Robt. and Elizabeth Shackleton, *Sat. Evening Post*, Mch. 31, Apr. 21.

Glass Industry, *Paint Oil and Drug Rev.*, Apr. 4.

India, The Canals and Railways in, L. H. Yates, *Sci. Am.*, Apr. 21.

Insurance, Special Number of, *World's Work*.

Negro, "Twenty-five Years of Tuskegee," (Ill.), Booker T. Washington, *World's Work*.

Rice Crop of British India, *Crop Reporter*.

Riches, Chas. W. Eliot, *World's Work*.

Steel, The Story of, (Ill.), Frank Fayant, *Success*.

Tanning: Why is the American Tanner so Successful? F. Kopecky, *Hide and Leather*, Apr. 21.

RECENT DECISIONS OF U. S. BOARD ON GEOGRAPHIC NAMES

Black: mountain, Mohave county, Ariz. (Not Ute.)

Carbon: peak, Elk mountains, Gunnison county, Colo. (Not Castle Peak, Mount Carbon nor Mount Ohio.)

Dead: mountains, San Bernardino county, Calif. (Not Black.)

Elk Point: township and village, Union county, S. D. (Not Elkpoint.)

Harney: peak, Black Hills, Pennington county, S. D. (Not Harney's.)

Marble: island, Sea Otter sound, southeastern Alaska. (Not Fox.)

Mohave: mountains, east of Colorado River, Mohave county, Ariz. (Not Chemehuevis nor Chimhuevis.)

Orca: bay, Prince William sound, Alaska. (Not Cordova.)

Poquoson: river, emptying into Chesapeake bay, Va. (Not Pocason, Pocasin, nor Poquosin.)

Racetrack: peak at the head of Boulder creek, latitude $46^{\circ}21'$; longitude $113^{\circ}02'$; Granite county, Mont. (Not Mount Powell.)

Tsadaka: creek, tributary to Matanuska river, 20 miles above Knik arm of Cook inlet, Alaska. (Not Moose.)

Tunp: mountain range, above Rock creek, west of Hams Fork plateau, east of Sublets range, Uinta county, Wyo. (Not Campbell, Seedskeedee, nor Tetlick.)

ADJUSTMENTS AND READJUSTMENTS

ON a number of hills in southern Vermont are the foundations and tumbled walls of the old buildings of towns long since abandoned.

Leading to these hilltop ruins are old roads now badly washed and often less passable than the nearby hillside. The hills rise to various altitudes from 100-1,000 feet above the valleys, and their forms are easily correlated with the mature dissection evidenced in all the valleys.

At present the villages, almost without exception, are in the valleys and near the streams, while roads, except where necessary, never cross hills, but wind delightfully around hill and spur, remaining always close to brook and stream. Noting the striking differences in the present and past locations of towns and roads and the consequent differences in the distribution of the population one is prompted to ask, Is the doctrine, stating man's adjustment to, and an agreement with his geographic surroundings, awry here? Has man in early or in later times gone sadly contrary to nature's dictum in locating his villages and laying out his roads? It would certainly seem so, at least until the student becomes familiar with the conditions.

Two hundred years ago, the hills were much as they are to-day, and the valleys led as directly from place to place as now; but then hill was relatively less timbered than valley, and the valley itself was almost impassable, because of swamp and rank undergrowth in the forest. Glaciers had interfered with drainage, producing lakes, marshes and bogs along the valleys, while little obstruction had been accomplished on the hills. The early settler's means of transportation were either his own legs or those of a horse, and only rarely the wheeled vehicle. For these reasons he chose to keep out of the valleys as much as possible and to travel high enough on the hillsides to avoid mud and slough.

Then, too, his well founded fear of the ubiquitous savage led him to dwell upon the hilltops where he could see approaching danger or be forewarned by distant curling smoke. No wonder he began his occupation of the territory from the hilltops. That process was in close adjustment to the conditions and necessities of the case.

His culture crept down the slopes; his mills possessed the streams; his energy cleared paths along the valleys. Better drainage recovered from pond and marsh, level areas of deep rich soil; while social and political exigencies gradually removed the savage.

With this development of valley industry, dependent upon the water-power, and the discovery of the better valley soils, came also the removal of the necessity of hilltop residence for protection, and of summit and slope highways for ready communication; and, at the same time, the wheeled vehicle, so much better adapted for valley travel, came into use. This latter may have been in part a response to the conditions of better roads, but was also an expression of better financial circumstances, just as is the two-seated phaeton in the prairie states, where not many years ago the lumber wagon was the best a farmer could afford and the only vehicle which could survive the winter roughness and the spring mud of the roads.

And so, as the culture descended the slopes there followed the roads, the dwellings, and business houses, and finally the churches, until now, except along some of the divides, scarcely a building or passable road can be found near the hill summits. The whole *ensemble* of culture features is down in the valleys and the hills, where not retained in grass and pasture, are reverting to timber.

Without losing his connection with the first places which called forth his energy and furnished him sustenance, man has taken advantage of much of his environment which he was then unable to use and has completely changed his center of operations and form of occupation. Much more of the physiographic than formerly now influences him to advantage and in the readjustment he is more responsive to his surrounding conditions, having come into closer union with them.

G. D. HUBBARD.

CORN THE FOOD STAPLE OF MEXICO.—Corn is to Mexico what oats is to Scotland, what rice is to the Orient. Mexico's laboring classes, the people who work in the mines, on the great plantations, and along the lines of the railways, subsist chiefly on corn; and a hardier, more muscular set it would be difficult to find.

While corn is employed for a number of food articles, the commonest one, which frequently forms the sole food of the very poor, is the tortilla or flat, unleavened corncake. Considerable labor is necessary to evolve the tortilla, and many women devote their days and a larger portion of their nights to its manufacture. The kernels are first soaked in lime water until they become soft, and then ground between stones into a paste, which is shaped into round, flat cakes, and baked on hot earthenware over a charcoal fire.

Indians will make long journeyings with a few dozens of tortillas slung over the arm for rations, and no other beverage save that supplied by the streams along their line of march. The methods for growing corn in Mexico are frequently the primitive ones in vogue three centuries ago, the plow being an inadequate, wooden contrivance, which does little more than scratch the surface of the ground, and the manner of planting, harvesting and storing being equally antiquated.

Yet so precious is the plant that not a particle is wasted, the stalks and the roots being used for constructing fences and houses, and often for fuel, while the fodder is fed to horses and cattle, who, in some regions, prefer it to hay.

The well being of Mexico's lower classes depends on the corn crop, and a few years ago when this failed, the Government removed the import duty on corn to avert a famine.—*Modern Mexico*.

THE NAVAHO INDIANS.—The principal industry among the Navahos is the growing of sheep. It is a poor family, indeed, that does not possess a flock of sheep and goats. Goats will be found in almost every herd. They are prized chiefly for their meat and skins. The goats are also desirable additions to the flocks from their habit of leading out and scattering the sheep sufficiently to graze over a large area, which is necessary for the best development of flocks in the Navaho country. It is estimated that about five acres of ground are here required to support a single sheep. The goats are also useful in protecting the sheep from attacks by wolves and coyottes. The goat will show fight while the sheep meekly submits to his fate.

The Navaho reservation is a large one, containing about 12,000 square miles, with an Indian population of about 16,000. The Navaho needs all of this land, though to the casual observer it is very difficult to understand why this should be so. One can travel all day long over this reservation and not meet a single Indian. Nevertheless, every acre that will grow grass they utilize for grazing their flocks and herds. They have many ponies and a few cattle, as well as sheep and goats. A few sheep require a large area to support them, and since they are not fed during the winter months, it is necessary that they should have winter pasture as well as pasture in summer. No one knows better than the Navaho how to use a barren desert to the best advantage.

The flocks, as a rule, belong to the women of the tribe who with the children take care of the sheep and goats. It is not an unusual sight for one crossing the reservation to see a small tot, not more than six years old, tending the flock all alone. Unlike many other tribes, the Navahos believe in teaching their children to work. A trifling, shiftless Navaho is an object of universal scorn and contempt. When they take their children to the Government schools the only request they have to make is that the authorities take good care of the children and teach them to work. The parents want them to learn to work like the white men—to do useful things in a skilful way.

The Navaho leads a wandering life. His occupation makes impossible any fixed habitation. He must follow his flocks, often many miles during a year. He lives chiefly out of doors with only the rudest sort of a shelter to protect him from the weather. He has no furniture, for he needs none. He sits and sleeps on the ground. A few simple cooking utensils, his blankets, and a few days' provisions make up his camp equipage. More than this would be a burden. His is the simple life and he wants only such things as contribute to his necessity. No luxuries for him! He hasn't the time to bother with them; he is too busy making a living. His wants are

few; but he must keep busy to supply these few wants. It is not a matter of how well he may live, but whether he can live at all. Eternal hustle is the price of existence on a barren desert, where five acres of land are required to support a single sheep.—*The Southern Workman*, January, 1906.

THE TRANS-ANDINE RAILWAY.—“On the Chilean side, the road was completed from the seashore by way of Santiago and Mendoza to Salto del Soldado in August, 1893, and since then the Chilean Government, by contract, has extended the line from Salto del Soldado to Juncal, a distance of 27 kilometers, or 15 miles. Salto del Soldado is at a height of 1,262 meters, or 4,140 feet, above sea level, and Juncal is 2,222 meters, or 7,290 feet, above the sea. From Juncal, the point reached, to the boundary line between Chile and the Argentine Republic, the remaining distance is only 15 kilometers, or about 9 miles, and to reach the border the road will rise to a height of 3,189 meters, or 10,460 feet.

“Work at such an elevation is carried on with great difficulty. There are many tunnels and bridges, and the engineering difficulties were very great. In addition, it has been impossible to do much work during the winter season, as the region is then covered with deep snow. Great avalanches slide down the sides of the mountains, sweeping everything before them, and so the work has to be suspended during several months of the year.

“As early as 1888, when the two ends of this great railroad were 75 miles apart, travel began over the route. Passengers, mails, and a limited amount of freight were sent to Los Andes by train, and from there to the end of the road on the Argentine side were transported on mule back. From the Argentine end to the city of Buenos Ayres the track is in fairly good condition, and Pullman cars go through in about twenty-four hours.

“Yet transit over the route is only possible in the summer season. Beginning in December, trains run to the end of the line in January and February, but in March it begins to be difficult to get through and by the end of the month traffic is usually suspended. Thus the road, so far, has been available for business only a small part of the year, and considering the difficulties and expense of construction and operation it seems doubtful if it will ever be self-sustaining.”—*Monthly Bulletin, International Bureau of American Republics*.

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THE GREAT FAULT OF CALIFORNIA AND THE SAN FRANCISCO EARTHQUAKE, APRIL 18, '06

By EVERETT P. CAREY
San José, Cal.

THE earthquake occurred on the morning of April 18 at San José, about 5:13, Pacific Standard time. The morning was calm, clear and pleasant. The barometer in central California stood about normal, while according to the weather map an area of high pressure extended over northern California, moving in the direction of Idaho.

The shock came without premonition of any sort, no jars preceded it. It was accompanied by violent heaving motions and lasted about forty-eight seconds. Many observers claimed that it was attended by a peculiar roaring rushing noise, somewhat resembling that of a train passing through a tunnel to a man standing above the tunnel. On account of the suddenness of the earthquake, the minds of the people were unprepared, so that temporary surprise and wonder gave way in many cases to fear: thus the subsequent minor shocks frequently caused more manifestations of alarm than the original shock.

Up to the present date of writing (May 21) the subsequent shocks have been of almost daily occurrence, but, according to observers in different parts of the field affected, they have varied somewhat in number and intensity. Between 5:13 A.M. and 7:00 P.M. of April 18 no less than 30 shocks were recorded. During the remainder of the month of April they averaged about two daily, while between May 1 and May 19 inclusive but thirteen are reported by Maurice Connell, weather observer of San José, who states that none of these thirteen shocks exceeded twenty seconds in time, while the majority were between five and eight seconds.

Earthquakes have been grouped as regards their origin into two classes:

1. Those connected with volcanic activity.

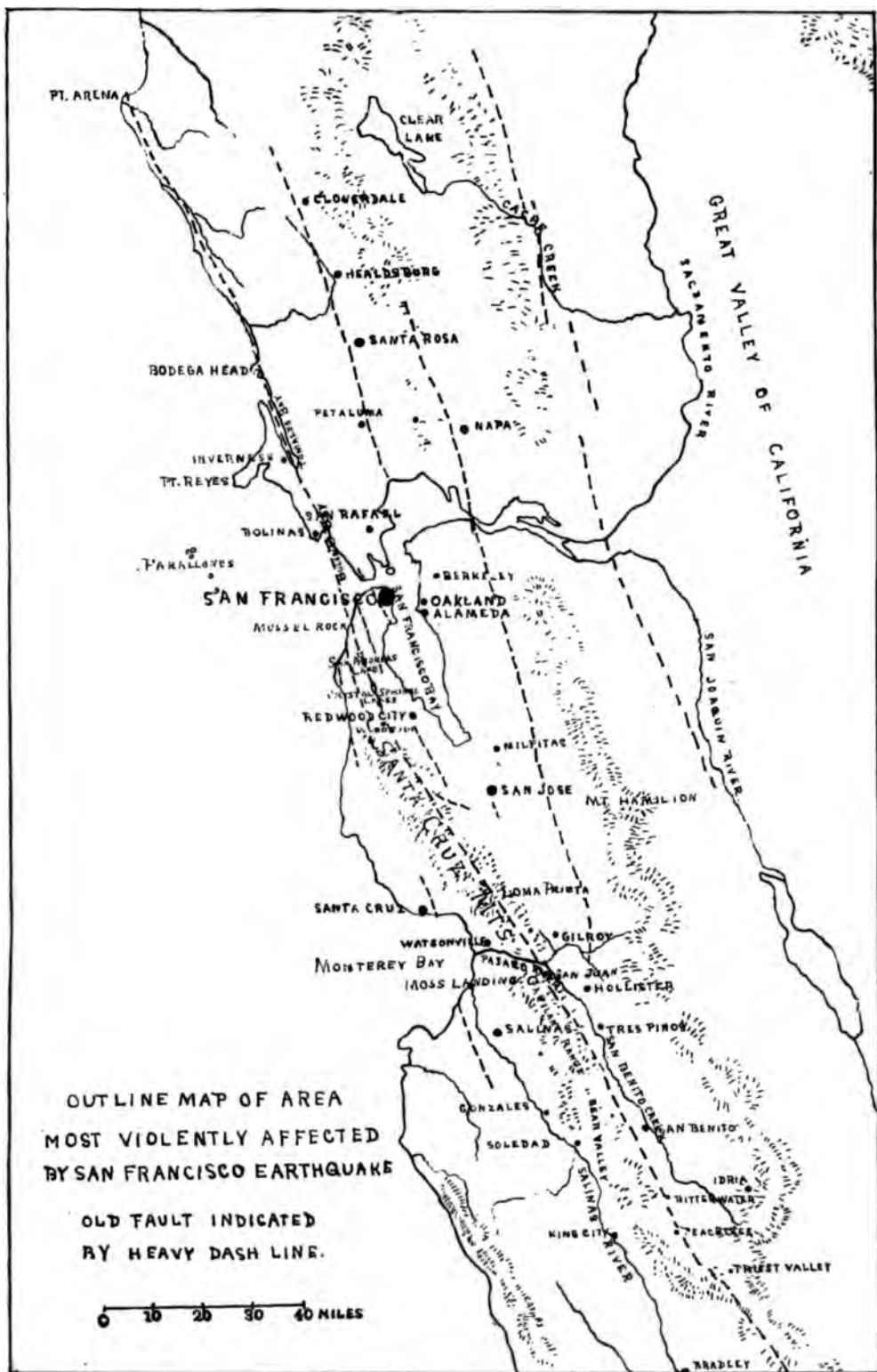
2. Those connected with fractures or slips of the solid crust of the earth.

In the light of the field evidence, not much doubt now exists that this quake belongs to the second class, and for this reason it is easy to see why no preliminary tremors occurred. The stress in mountain building accumulates steadily, while the relief that it finds in the fracture or slipping of the crust is comparatively sudden. On the other hand the shocks connected with volcanic explosions are more likely to yield slight preliminary jars, just as a few bubbles of gas may escape before a body of water reaches the boiling point.

The evidence that the recent disturbance was accompanied by earth displacements is unmistakably clear. Prof. J. D. Whitney while State Geologist for California (1860-1874) called attention to the extremely broken and fractured condition of the rocks of the California Coast Ranges, and every field observer since that day has had opportunity to verify this statement.

Prof. A. C. Lawson of the University of California in his "Geology of the San Francisco Peninsula," 15th Annual Report U. S. Geological Survey, traced many of the faults in the area recently disturbed, and Dr. Branner of Stanford University has indicated others in his work on the Santa Cruz quadrangle now in the hands of U. S. Geological Survey at Washington, D. C. for publication. These two publications embrace the southern part of the area recently most violently disturbed. In this connection it is safe to say that the main topographic features of California are due to faulting. The trend of her valleys and mountain ranges coincides with the direction of her dominant faults, and her river courses in many cases are determined by faulting. Now, as these fractures result in jars it is easy to see that earthquakes have been intimately associated with her geological history.

One of these old fissure lines (see map) which opened afresh along the northern part of its course evidently played an important part in connection with the recent disturbance. This old fault zone is worthy of mention along with the few great fissure lines of the earth, and will now be described. It extends from near Point Arena in Mendocino county southward and very near the coast line through the V-shaped valley containing Tomales Bay, through Bolinas Bay, thence south under the ocean, leaving San Francisco and the Golden Gate to the east, striking the mainland again at Mussel Rock, and in its course through the Santa Cruz Mountains passing through San Andreas Lake, the Crystal Springs Lakes, Woodside, over Black Mountain, along Stevens and Campbell Creeks, Wright's Sta-



tion, Skyland and Loma Prieta to a little south of the Pajarro river, crossing this river near the town of San Juan. Along this distance of about 200 miles there is evidence of a slip or dislocation of the crust of the earth, which accompanied the earthquake of April 18. The zone of maximum destruction follows this line and extends out from it on either side for a few miles.

South of Chittenden, near San Juan, this old fault zone passes to the east of the towns of San Juan and Hollister, following a continuous line



Road Near Summit of Santa Cruz Mountains Above Wright's Station on Morrell Ranch. The Lateral Displacement Here is About Four Feet.

of drainage in the eastern foothills of the Gavilan range of mountains, thus skirting the western side of the San Benito Creek Valley. Crossing the mouth of Willow Creek it extends south between Bear Valley and San Benito Valley. It passes west of the town of San Benito, southerly through Dry Lake Valley, Rabbit Valley, Bitterwater Valley, Priest Valley and the Carisa plains, San Luis Obispo Co. South of this its trend seems to be to the southwest of the Mohave Desert, along the northeastern slope of the San Gabriel mountains, through Cajon Pass, the Colorado Desert, and to the Colorado river and the Gulf of California. Its north and south extent is not less than six hundred miles. It connects in a continuous line an interesting series of structure valleys, and has been associated with several well-known historic California earthquakes.*

*Dr. H. W. Fairbanks had recognized this old earthquake zone by its peculiar topography and had lectured

The zone has not been determined by a single fracture line, but is rather the result of a series of fractures along a dominant line of weakness. The rocks on either side are usually much crushed or broken. It is further characterized by ridges and unusual depressions which can in no way be accounted for by erosion. The fractures have also resulted in the accumulation of an unusual water supply difficult to explain except on the hypothesis of a fault. Even in the dry regions of the South we have along this zone in winter a series of small lakes or ponds. The evidence



Contorted Rails, a Result of Compression Due to the Earthquake, Near Alder-croft on Narrow Gauge Railway over Santa Cruz Mountains.

of faulting is also shown in the relations of the rocks themselves on either side of the fault. Along the line of this fault rocks in a vertical range have been observed from the basal complex of metamorphic schists and granites up through Cretaceous, Tertiary and Pleistocene formations. Unlike some of the few great fault lines of the earth, this one has continued in its activity from prehistoric times down to the present. Thus this fissure, which has played an important part in the development of the California coast ranges, is to-day opened anew at least along the northern part of its extent.

Erosion has naturally rubbed out much of the fresh evidence of former

on it before the Academy of Sciences, San Francisco, previous to the earthquake of April 18th. He has traced it practically throughout its entire length and states that it is not yet clear whether or not the fault extends further south than the western base of the San Bernardino Range in San Bernardino County.

faulting along this old fissure line. The crack itself is not open to view, nor can the slickensided surfaces even be seen in many instances. The fault scarp, as is usual in the case of old faults, has been worn back some distance from the original fracture line. The fissures have in this way been filled and the region covered with several feet of soil. It is therefore difficult to observe the amount of actual bed-rock movement in the present disturbance. The surface material has been broken, however, along this already determined line, and the dislocation amounts in places to at least twenty feet. The main movement is lateral, or horizontal, and is shown by the shifting of fences, water pipes or mains, broken-off roots



Showing a Fence Laterally Displaced by Fissure Movement Near Woodside, Santa Cruz Mountains. Displacement Nearly Six Feet.

of trees, dislocated roads, dams, and streamlets. Water pipes, fences or lines of trees for example, which cross the fracture line are broken across and displaced laterally from a few inches to several feet. Thus an extra length of fence is needed here and there for repairs; while to compensate, the missing panel is crowded in somewhere else along the line. The effect of this surface compression and distension on the rock below the surface can better be imagined than discerned. Large trees along the fracture zone are in some instances uprooted, houses rent in twain, the parts separating in opposite directions. In one observed instance a barn near Woodside was located immediately over the fracture, the ridge pole being parallel

with the fracture line. The barn split longitudinally and one side was moved along about five feet with reference to the other side.

Mr. C. S. Downes of Berkeley who has just investigated the reopened fissure from Bolinas to Inverness writes: "I found half a dozen east-west fences that were displaced from four to twenty feet. The peninsula to the west has moved north anywhere from three to twenty feet. The crack looks as though a large plow had been over the ground and left an immense furrow. In some cases there is a few inches of vertical displacement. At Inverness it is fifteen to eighteen inches along a secondary crack." Mr. Downes confirms the story of the loss of a cow on the Shafter Ranch that fell head foremost into a fissure and disappeared, all but her tail. The writer has not observed a lateral displacement along the reopened fissure through the Santa Cruz Mountains to exceed eight and a half feet. Observers from the north have reported that a lateral displacement of from ten to twenty feet is not unusual, while as a rule the west or seaward side has become elevated with reference to the east side. This elevation has not been reported to exceed three or four feet. On the other hand the reverse is true in many cases along the southern end of the fissure line, where, in San Mateo and Santa Cruz counties the east side is elevated with reference to the west side. The lateral displacement near Pajarro is about one and a half feet; along toward Pt. Arena it reaches about twenty feet.

It is now confirmed that north of Pt. Arena in Mendocino County the town of Fort Bragg was destroyed and that villages along the coast in Humboldt County suffered severely. This would indicate that the fault entering the ocean near Pt. Arena probably continued north indefinitely a short distance to the west of the coast line.

It was at first conjectured that the centre of disturbance was near San Francisco. Later evidence seemed to indicate that it was further north along the coast. Some have intimated that the fissure may be connected with some volcanic outburst in the Pacific Ocean, Behring Sea, or in Alaska. No sulphurous or other fumes indicating a connection with volcanic activity have been observed, and it seems reasonable to predict that the centre of disturbance will prove to be connected with the axis of the fissure already described, which extends below the surface of the earth to an unknown depth.

The shock was intense enough to break off the trunks and branches of large trees, such as the tall redwoods; and literally to shatter the rock adjacent to the fissure into thousands of pieces. These cracks frequently extend from the main fissure line in an irregular network, so that hundreds

of cracks may be observed in the space of a few rods. There is a lack of uniformity in the character and development of cracks along the fracture zone, being best developed in the case of hard, dry, compact rock material, while moist, soft loose rock shows little or no displacement. It seems highly probable that the surface displacement is not a true index of the bed-rock displacement, and that where the surface material is of a nature to admit of free internal adjustment, a comparatively large deep-seated



San José High School, Typical of Destructive Effects on Brick Buildings.

displacement of the bed rock may not be indicated at all at the surface. Often the surface of the fissure zone resembles a huge plowed furrow or newly made road. Closer inspection reveals often an irregular network of cracks running obliquely to the trend of the fracture zone, just as glass or other brittle substance may be broken diagonally when subjected to a side-wise torsion beyond its breaking strength.

While the disturbance appeared to be greatest along the axis of the fault line running through the Santa Cruz mountains and north along the coast to near Pt. Arena the damage in the valleys to the east and west was great. The Salinas Valley to the west was shaken considerably, as

was the valley region to the east, extending from Hollister past Santa Rosa to the Russian River. No damage is reported south of Tres Pinos except at Priest Valley, where chimneys were thrown down and fissures in the ground reported. It is clear that all along the fissure line for a distance of about twenty miles on either side, extending from near Hollister to Pt. Arena, and still further north, embracing the western part of Humboldt County, the intensity of the movement was greatest. Toward the Great Valley of California and the Sierra Nevada Mountains the shock was perceptibly diminished. Reports from towns along the foothills of the Sierra Nevada Mountains indicate that the shock there was evident to the senses, but that it was slight and comparatively simple in its motions. The minor vibrations there had evidently become dissipated or blended with the fundamental vibration. It was felt as far south as Los Angeles and north into Oregon. On the east it was felt as far as Nevada. Beyond these limits it was recorded on seismographs throughout the world.

Within the area of maximum intensity the earthquake behaved in a somewhat freakish manner when judged by the resulting damage. The destruction of buildings, however, seems to depend, on the one hand, on the soundness of construction, and, on the other, on the firmness of the bed rock foundation. Re-surveys in San Francisco show that property lines are considerably displaced where the land is loose or "made," while on the hills little or no dislocation is observed. On the rocky island of Alcatraz, just north of San Francisco, in Golden Gate, the shock was very slight and accompanied by no destruction. The cities of Santa Rosa, San José, and Salinas, built on loose bottom land, suffered severely. In Redwood City the public buildings are on the flood plain of a slough and are practically demolished. At Bolinas the only houses saved were those built on solid rock foundations. Agnew's Asylum, Moss Landing, Stanford University, Spreckle's Sugar Mill, were all badly wrecked, their foundations being in loose alluvial material.

Evidence of change of altitude above mean sea level as well as of latitude and longitude will have to rest upon accurate surveys.

Near Pescadero natural illuminating gas is reported to have escaped from fissures made in the ground, but during subsequent shocks the amount that escaped steadily decreased. Landslides were abundant, especially in the Santa Cruz Mountains, where the topography is more rugged. One slide, a few miles from Wright's Station, involved eight to ten acres of ground. At Bolinas and Inverness buildings were toppled over into the sea and a near by train of cars was thrown over. Near Milpitas along the Coyote Creek artesian water gushed out of cracks and holes in the

ground, making temporary fountains several feet high, bringing up silt and forming cones about the outlet, as shown in photograph. Similar outpourings of water are reported from the Salinas valley. In some cases artesian wells stopped flowing, but in general the water level was raised, so that many ordinary wells overflowed. The water in most cases was more or less muddy.

The burning of San Francisco, with the loss of several hundred lives, was the most disastrous consequence of the earthquake and this was very directly connected with this old fault line. The water supply on which the city depended was derived from numerous lakes developed along this old fissure zone. The water mains in some instances followed along the fault itself and crossed it in several places. It was the displacement and



Silt Cones Along Earthquake Crack Near Milpitas Formed by Gushing Out of Artesian Water at Time of Earthquake.

destruction of these water mains brought about by the slip that made it impossible to save the city from destruction by fire.

The disturbance had the effect of lowering the general level of alluvial land and opening in it numerous cracks. In several instances in the Santa Clara Valley water pipes in wells dug through the uncompacted and unconsolidated valley sands, gravels and clays showed, after the shock, a foot or more of the pipe above the general surface of the ground. The alluvium thus became more compacted and compressed, just as jarring a bag of grain causes it to occupy less volume. This compacting of the rock



Showing Series of Lakelets Along Old Fault Zone West of Town of San Benito, San Benito County.

material was probably a factor in bringing about a general rise of the water level in ordinary wells as well as an increased flow from artesian wells and springs.

It does not seem clear whether the discontinuous, but somewhat linearly arranged surface cracks extending for several miles along the water courses of the Santa Clara Valley, as well as in other places remote from the main fissure zone, indicates a fault in the bed rock below, or whether this fracturing is wholly dependent on the nature of the surface rock. It is but natural to assume that one main fissure movement should be accompanied by others in neighboring parts of the field, just as one ice crack is usually accompanied

by others making a succession of ice blocks which adjust themselves finally to the pressure conditions. It is undoubtedly true, however, that many of the cracks developed in alluvial material remote from the main fissure line are due to the jarring effect radiating out from along the axis of the main fissure. They thus represent the effects of the quake and are in no way connected with its cause. In general the main cleft or fissure is not open except where it follows along a sloping or inclined surface.

In some cases fissures opened and closed tightly again with a force sufficient to cause a surface ridge of a few inches along the fissure line, just as ice is observed to bulge up along the line of ice cracks where subjected to a horizontal pressure. In other cases blocks of earth fell down into the cracks from the sides for a few feet, as is shown by the photograph of fissures from near Milpitas. This seems to explain the occurrence of depressions along the old earthquake zone, as shown in the photograph from near the town of San Benito, a common feature already mentioned, along this old earthquake zone. Erosion of course would quite soon obliterate the fissures. In other cases the cracks that were at first very deep, so that the bottom could not be seen, were observed to close up gradually in the course of a few days.

In the light of the evidence it was a shock of considerable intensity, and in view of the wide area affected, the length of the surface fissure and the complexity of the motions will rank with the few great earthquakes of the world. It is clear that buildings solidly constructed were able to withstand the shock even if located along the fracture zone. Had the displacement, however, been chiefly vertical instead of horizontal, the destruction of life and property would have undoubtedly been very much greater, in which case, too, since the old fissure zone extends out to sea, destructive tidal waves would have been generated. The horizontal movement in this case probably accounts for the absence of a tidal wave. In any event such a wave could not enter the Golden Gate to the destruction of life in the cities on the borders of San Francisco Bay because the narrow inlet tends to prevent extremes of tidal level within the bay.

Past history would indicate that California is not likely soon to be freed from earthquakes. Her solidly built missions are now nearly all in ruins. The people, however, unhampered by Oriental fatalism or religious frenzy, cannot afford to lose the important lesson and nothing should deter them from building stable structures even at the expense, if necessary, of beauty, for elements of beauty in modern architecture too often are allied with elements of weakness. At this date of writing, however, the subsequent shocks are becoming less frequent, the fears of

the people are subsiding, and much consolation is had in the fact that rocks once faulted or broken are incapable of resisting any large accumulation of strain, but will yield forthwith. Hence no quakes of unusual magnitude are likely soon to occur even though the hidden forces which bring about fissures and accompanying shocks are still likely to be operative.

N. B. The writer has since observed a parallel fissure about two miles to the east of the main fissure, passing through Baden and Merced Lake. North of Baden this fissure is evident for about half a mile and here shows a lateral displacement, the west side moving north with reference to the east side. This would indicate that while the lateral displacement along the main fissure line already described was north with reference to the east side, this movement was relative and that both sides moved north with reference to points still further east.

THE VALPARAISO EARTHQUAKE.

Three earthquakes of great intensity, closely following each other, took place about 8 P. M., August 16th, and practically annihilated our flourishing city. Immediately numerous fires resulted and spread to a conflagration which finished much of the destruction originated by the earthquakes. There was an inadequate supply of water and the firemen were utterly helpless to cope with the flames. The gas and electric light establishments were also deranged, so that except for the light from burning buildings the town was left in darkness. The consternation was terrible, the populace being utterly panicstricken.

The military authorities took charge of the place immediately after the disaster, and the behavior of officers and troops has been excellent. Martial law was promptly proclaimed, and still continues, looters and incendiaries being shot mercilessly. The first apprehensions of famine and thirst were soon allayed by the exemplary manner in which the authorities commandeered food supplies and established strict discipline in respect of the water service.

Now that some calm has returned to the city it is possible to gather fairly reliable information. The casualties have been very heavy. The mortality is fully 2,500 and the injured 4,000 to 5,000 cases.

As to material losses, it is impossible to get at any close estimate yet of the "value" that has been destroyed. But our own personal observations, corroborated by other opinions, justify us in stating that not a single structure of any sort has escaped without some earthquake damage. In fact, we would summarize the damage to property in Valparaiso as:

Absolutely wrecked and ruined by earthquake, 50 per cent.

Destruction finished by conflagrations, some immediately on the heels of the earthquakes and others in the succeeding four to five days, 25 per cent.

Buildings with damages ranging from great to trifling, and many of which will have to be razed, 25 per cent.

Expressed this way, the figures will help to convey a graphic idea of the exceptionally severe nature of the calamity.

THE CHARACTERISTICS OF THE ZONES

I.—THE TROPICS*

By ROBERT DE C. WARD
Harvard University

Synopsis

General: climate and weather.—Temperature.—The seasons.—Physiological effects of heat and humidity.—Pressure.—Winds and rainfall.—Land and sea breezes.—Thunderstorms.—Cloudiness.—Intensity of sky-light and twilight.—Climatic subdivisions:—I. The equatorial belt.—II. Trade wind belts.—III. Monsoon belts.—IV. Mountain climate.

General: Climate and Weather. The so-called "Torrid Zone" has been variously bounded. Its limits have been set at the tropics (lat. $23\frac{1}{2}^{\circ}$); at the mean annual isotherms of 68° , which also correspond closely with the poleward extension of palms; and at the polar margins of the trade winds. The dominant characteristic of this great belt, embracing but a little less than one-half of the earth's surface, is the remarkable simplicity and uniformity of its climatic features. This simplicity is reflected in the striking regularity in the recurrence of the ordinary weather phenomena. The tropics lack the proverbial uncertainty and changeableness which characterize the weather of the higher latitudes. In the torrid zone, weather and climate are essentially synonymous terms. Periodic phenomena, depending upon the daily and annual march of the sun, are dominant. Non-periodic weather changes are wholly subordinate. The succession of daily weather changes is even more regular, and the distribution of the climatic elements is even more uniform over the tropical oceans than over the lands. In special regions only, and at special seasons, is the regular sequence of weather temporarily interrupted by an occasional tropical cyclone. These cyclones, although comparatively infrequent, are notable features of the climate of the areas in which they occur. Generally bringing very heavy rains, and thus locally increasing the total annual precipitation by a considerable amount, they yet cause no marked temperature changes such as those which are the common accompaniments of

* This article and the two which are to follow (II. The Temperate Zones; III. The Polar Zones) are intended to give an outline of the more important climatic characteristics of the zones in a simple form, which may be helpful to teachers of geography. The writer has naturally drawn largely from Hann's standard works, the *Handbuch der Klimatologie* (2d ed., 1897, Vol. II) and the *Lehrbuch der Meteorologie* (2d ed., 1906). The data for the curves which were drawn expressly for this article, were taken from the *Lehrbuch*.

The following books were also used: Bartholomew's *Atlas of Meteorology*, Edinburgh, 1899. W. M. Davis: *Elementary Meteorology*, Boston, 1902. W. Köppen: *Klimalehre*, Leipzig, 1899. F. Ratzel: *Anthropogeographie*, 2d ed., Stuttgart, 1899. A. Supan: *Grundzüge der Physischen Erdkunde*, 3d ed., Leipzig, 1903. W. Trabert: *Meteorologie und Klimatologie*, Leipzig and Vienna, 1905. W. J. van Bebbet: *Hygienische Meteorologie*, Stuttgart, 1895. A. Woeikof: *Die Klimate der Erde*, Jena, 1887.

extra-tropical cyclones. The devastation produced by one of these storms often affects the economic condition of the people in the district of its occurrence for many years.

Temperature. The sun is always well up in the sky. The length of day and night varies little. Hence the mean temperature is high, it is very uniform over the whole zone, and there is little variation during the year. The mean annual isotherm of 68° is a rational limit at the polar margins of the zone, and the mean annual isotherm of 80° encloses the greater portion of the land areas, as well as much of the tropical oceans. The isotherms are thus far apart. The warmest latitude circle for the year is not the equator, but latitude 10° north. The highest mean annual temperatures, shown by the isotherm of 85° , are in Central Africa, in India, the north of Australia and Central America, but, with the exception of the first, these areas are small. Massowah, on the Red Sea, has an annual mean of over 86° . The temperatures average highest where there is little rain. In June, July and August there are large districts in the south of Asia, and north of Africa with temperatures over 90° . Winds blowing out from these heated deserts are uncomfortably hot and dusty.

Over nearly all of the zone the mean annual range of temperature is less than 10° , and over much of it, especially the oceans, it is less than 5° . At Equatorville, in the interior of Africa, on the Congo, the mean annual range is only a little over 2° ; at Iquitos. (lat. 3.7° S.) in Peru, it is 4.3° . Even near the margins of the zone, where the seasonal differences are greatest, the ranges are less than 25° , as at Calcutta, Hong Kong, Rio de Janeiro and Khartoum. The mean daily range is usually larger than the mean annual. Thus at Equatorville, the former is about 14.5° . It has been well said that "night is the winter of the tropics." The differences between the maximum and minimum temperatures of the year near the equator are not much greater than the daily range. Over an area covering parts of the Pacific and Indian Oceans from Arabia to the Caroline Islands and from Zanzibar to New Guinea, as well as on the Guiana coast, the minimum temperatures do not normally fall below 68° , and over much of the torrid zone as a whole they do not fall below 59° . Towards the margins of the zone, however, the minima on the continents fall to or even below 32° . Maxima of 115° and even over 120° (122°) occur over the deserts of northern Africa. A district where the mean maxima exceed 113° extends from the western Sahara to northwestern India, and over Central Australia. Near the equator the maxima are therefore not as high as those in many so-called "temperate" climates. The greater portion of the torrid zone is a water surface, and marine con-

ditions are therefore typical for most of it. These tropical oceans show remarkably small variations in temperature. The "Challenger" results on the equator showed a daily range of hardly 0.7° in the surface water temperature, and Schott determined the annual range as 4.1° on the equator; 4.3° at latitude 10° , and 6.5° at latitude 20° . It has been clearly pointed out by Hann that the uniform distribution of temperature throughout the year—the dominant feature of the tropics—results not only from (1) the small variation in insolation and in the length of the day, but also (2) from the great extent of the zone, which makes it impossible for cold winds from higher latitudes to penetrate into the lower latitudes; (3) the oblique course of the trades, which are well warmed on their indirect road towards the equator; (4) the slight nocturnal cooling, where the air is damp and vapor is readily condensed and (5) the great extent of the tropical oceans, which stamps so much of the zone with a marine climate.

The Seasons. In a true tropical climate, seasons, in the temperate zone sense, do not exist. The variations in temperature throughout the year are so slight that the seasons are not classified according to temperature, but depend on rainfall and the prevailing winds. The life of animals and plants in the tropics, and of man himself, is regulated very largely, in some cases almost wholly, by rainfall. Agriculture prospers, or fails, according to the sufficiency and punctual appearance of the rains. After a long dry season, when the rains come, there is an extraordinarily sudden awakening of the parched and dusty vegetation. Where, on the other hand, there is abundant moisture throughout the year, a tree may at the same time be carrying buds, blossoms and ripe fruit. Vegetation under these conditions has been well called non-periodic. Although the tropical rainy season is characteristically associated with a vertical sun (i. e., summer), that season is not necessarily the hottest time of the year. The temperature is usually somewhat lower under the clouds. The rainy season often goes by the name of winter for this reason, and also because the weather is dull. The time of the maximum temperature is also controlled by the rainy season. Towards the margins of the zone, with increasing annual ranges of temperature, seasons in the extra-tropical sense gradually appear.

Physiological Effects of Heat and Humidity. Tropical monotony of heat is associated with high relative humidity except over deserts and in dry seasons. The air is therefore muggy and oppressive. The high temperatures are disagreeable and hard to bear. The "hot-house air" has an enervating effect. Energetic physical and mental action are often difficult or even impossible. The tonic effect of a cold winter is lacking. The most humid districts in the tropics are the least desirable for persons from

higher latitudes; the driest are the healthiest. The most energetic natives are the desert-dwellers. The monotonously enervating heat of the humid tropics softens, so that man becomes sensitive to slight temperature changes. A fall of temperature to within a few degrees of 70° seems to some tropical natives almost unbearably cold, and certain African tribes sleep on clay banks heated inside by fires, although the mean temperature of the coldest month is over 70° . In drier climates such changes are more easily borne. People from latitudes where marked changes of temperature are common often become soft and susceptible in the tropics. The intensity of direct insolation, as well as of radiation from the earth's surface, may produce sunstroke and heat prostration. "Beware of the sun" is a good rule in the tropics.

Pressure. The uniform temperature distribution in the tropics involves uniform pressure distribution. Pressure gradients are weak. The annual fluctuations are slight, even on the continents. The diurnal variation of the barometer is so regular and so marked that, as von Humboldt said, the time of day can be told within about fifteen minutes if the reading of the barometer be known. Even severe thunderstorms do not overcome the regular diurnal march of the pressure, but the approach of tropical cyclones can be foretold by the pressure changes.

Winds and Rainfall. Within the tropics there are both heavy rains and large districts of very deficient precipitation. Along the barometric equator, where the pressure gradients are weakest, is the equatorial belt of calms, variable winds and rains—the doldrums. This belt, with its actively ascending damp, hot air, offers exceptionally favorable conditions for abundant rainfall, and belongs among the rainiest regions of the world, averaging probably about one hundred inches. The rainfall is so heavy that the salinity of the surface waters of the oceans is actually less than in the latitudes of the trades. Here the sky is prevailingly cloudy; the air is hot and oppressive; heavy showers and thunderstorms are frequent, chiefly in the afternoon and evening. Here are the dense tropical forests of the Amazon and of equatorial Africa. Here frost and drought need not be feared. This belt of calms and rains, of variable width, shifts north and south of the equator after the sun. It is dreaded by seamen because sailing vessels are apt to have long delays in crossing it. In striking contrast are the easterly trade winds, blowing between the tropical high pressure belts and the equatorial belt of low pressure. Of great regularity, embracing about one-half of the earth's surface, and adding greatly to the uniformity of tropical climates, the trades have long been favorite sailing routes because of the steadiness of their winds, the infre-

quency of storms, the brightness of their skies and the freshness of the air. The trades are subject to many variations. Their northern and southern margins shift north and south after the sun; at certain seasons they are interrupted often over wide areas near their equatorward margins, by the migrating belt of equatorial rains and by monsoons; near lands they are often interfered with by land and sea breezes; in certain regions they are invaded by violent cyclonic storms. The trades, except where they blow on to windward coasts or over mountains, are drying winds. They cause the deserts of northern Africa, eastern Asia, Australia, South Africa and southern South America. The monsoons on the southern and eastern coasts of Asia are the best known winds of their class. In the northern summer the southwest monsoon, warm and sultry, blows over the latitudes from about 10° north to and beyond the northern tropic, between Africa and the Philippines, giving rains over India, the East Indian Archipelago and the eastern coasts of China. These winds reach a storm velocity over the Arabian sea. In winter the northeast monsoon, the normal cold-season continental outflow from Asia, combined with the northeast trade, generally cool and dry, covers the same district, extending as far north as latitude 30° . Crossing the equator, these winds reach northern Australia and the western islands of the South Pacific as a northwest rainy monsoon, while this region in the opposite season has the normal southeast trade. Other monsoons are found in the Gulf of Guinea and in equatorial Africa. Wherever they occur, they control the seasonal changes.

The most important climatic phenomenon of the year in the tropics is the rainy season. Tropical rains are in the main summer rains, i. e., they follow as a general rule soon after the "vertical sun,"* the rainy season coming when the normal trade gives way to the equatorial belt of rains, or when the summer monsoon sets in. There are, however, many cases of a rainy season when the sun is low, especially on windward coasts in the trades. Tropical rains come usually in the form of heavy downpours and with a well-marked diurnal period, the maximum varying with the locality between noon and midnight. The conditions at Calcutta, as shown in the accompanying data are fairly typical.

*It will be remembered that at all places within the tropics the sun is vertical twice in the year.

*Diurnal Distribution of Rainfall at Calcutta.**

Midnight—2	A.M.	50	Noon—2	P.M.	111
2-4	A.M.	71	2-4	P.M.	116
4-6	A.M.	65	4-6	P.M.	120
6-8	A.M.	71	6-8	P.M.	128
8-10	A.M.	58	8-10	P.M.	73
10 A.M.—Noon		92	10 P.M.—Midnight		45

Local influences are, however, very important, and in many places night rainfall maxima are found.

Land and Sea Breezes. The sea breeze is an important climatic feature on many tropical coasts. With its regular occurrence, and its cool, clean air it serves to make many districts habitable for white settlers, and has deservedly won the name of "the doctor." On not a few coasts, the sea breeze is a true prevailing wind. The location of dwellings is often determined by the exposure of a site to the sea breeze. For this reason many native villages are put as near the sea as possible. The houses of well-to-do foreigners often occupy the healthiest and most desirable locations, where the sea breeze has a free entrance, while the poorer native classes live in the lower, less exposed and less desirable places. A social stratification is thus determined by the sea breeze.

Thunderstorms. Local thunderstorms are frequent in the humid portions of the tropics. They have a marked diurnal periodicity; find their best opportunity in the equatorial belt of weak pressure gradients and high temperature, and are commonly associated with the rainy season, being most common at the beginning and end of the regular rains. In many places, thunderstorms occur daily throughout their season, with extraordinary regularity and great intensity. Lightning, is, however, reported as very seldom doing any damage. Attention has been called to the fact that the frequent electrical discharges cause the rain water to be relatively rich in nitric acid. This condition, together with the carbon dioxide in the rain water and the high temperature of the same, promotes active and deep rock decomposition. In higher latitudes, where the ground may be frozen part of the year, and where the decomposing action of rain water is less, there is less of this action.

Cloudiness. Taken as a whole, the tropics are not favored with such clear skies as is often supposed. Cloudiness varies about as does the rainfall. The maximum is in the equatorial belt of calms and rains, where the sky is always more or less cloudy. The minimum is in the trade latitudes, where fair skies as a whole prevail.† The equatorial cloud belt moves north and south after the sun. Wholly clear days are very rare in

* Seven year record; expressed in thousandths of the daily mean.

† Supan, *Grundzüge der Physischen Erdkunde*, 3d ed., 1903, Fig. 13, page 51, gives a diagram showing the distribution of rainfall and cloudiness (also of other elements) according to latitude.

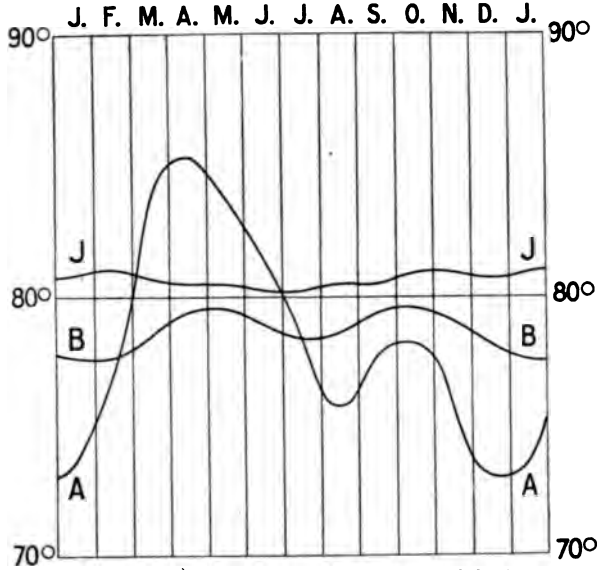
the tropics generally, especially near the equator, and during the rainy season heavy clouds usually cover the sky.

Tropical clouds and rainfall as a whole repeat, in an exaggerated form, the summer conditions of much of the north temperate zone. Broken skies; cumulus and cumulo-nimbus clouds; heavy showers or thunderstorms—these usually characterize the rainy season. Skies clear, or flecked with scattered small cumuli, are typical of the dry season. Wholly overcast, dull days, such as are common in the winter of the temperate zone, occur frequently only on tropical coasts in the vicinity of cold ocean currents, as in Peru and on parts of the west coast of Africa. In these same regions ocean fogs are common.

Intensity of Sky-light and Twilight. The intensity of the light from tropical skies by day is trying, even almost unbearable, to newcomers. The intense insolation, together with the reflection from the ground, increases the general dazzling glare under a tropical sun, necessitating protection of some sort. The far-famed deep blue of the tropical sky is much exaggerated. During much of the time smoke from forest and prairie fires (in the dry season); dust (in deserts) and water-vapor give the sky a pale, whitish appearance. In the heart of the trade wind belts at sea the sky is much more of a deep blue. The beauty of tropical sunrise and sunset, and of the tropical night, have, however, not been overrated. Twilight within the tropics is shorter than in higher latitudes, but the coming on of night is less sudden than is generally assumed. Pechuel-Lösche and others have shown that it is possible, on the Loango coast, to read ordinary print twenty to thirty minutes after sunset.

Climatic Subdivisions. The rational basis for a classification of the larger climatic provinces of the torrid zone is found in the general wind systems and in their control over rainfall. Following this scheme there are these subdivisions: I. The equatorial belt; II. The trade wind belts; III. The monsoon belts. In each of these subdivisions there are modifications due to ocean and continental influences. In general, both seasonal and diurnal phenomena and changes are more marked in continental interiors than on the oceans, islands and windward coasts. Further, the effect of altitude is so important that another class should be added to include IV. Mountain climates.

I. *The Equatorial Belt.* Within a few degrees of the equator, and when not interfered with by other controls, the annual curve of temperature has two maxima following the two zenithal positions of the sun, and two minima at about the time of the solstices. This, which is known as the *equatorial* type of annual march of temperature, is illustrated in the data and curves for the interior of Africa, Batavia, and Jaluit.



Annual March of Temperature: Equatorial Type.

A: Africa, interior. B: Batavia. J: Jaluit, Marshall Islands.

Table of Mean Monthly Temperatures for Selected Tropical Stations*

	I. Equatorial Type			II. Tropical Type				
	Conti- nental	Insular	Marine	Continental		Monsoon	Insular	
	Africa interior	Batavia	Jaluit, Marshall Islands	Wadi Halfa	Alice Springs	Nagpur	Hono- lulu	James- town
Lat.	8.1°N	6°11'S	5°55'N	21°53'N	23°38'S	21°9'N	21°18'N	15°55'S
Long.	23.6°E	106°50'E	169°40'E	31°20'E	133°37'E	79°11'E	157°50'N	5°43'W
Altitude	1837 ft.	23 ft.	10 ft.	426 ft.	1926 ft.	1093 ft.	49 ft.	39 ft.
Jan.	73.4°	77.5°	80.8°	61.3°	85.6°	68.2°	70.0°	73.6°
Feb.	77.2°	77.7°	81.0°	66.6°	83.3°	73.8°	70.3°	74.7°
Mar.	83.8°	78.4°	80.6°	73.0°	77.9°	83.7°	70.9°	75.9°
April	85.3°	79.3°	80.4°	81.0°	68.5°	90.3°	72.9°	75.0°
May	83.7°	79.5°	80.4°	87.1°	60.6°	94.3°	74.3°	71.8°
June	81.5°	78.8°	80.2°	91.4°	54.0°	85.6°	76.1°	69.4°
July	78.4°	78.3°	80.2°	93.4°	51.8°	80.1°	77.2°	67.6°
Aug.	75.7°	78.6°	80.4°	91.6°	59.4°	80.2°	77.5°	65.7°
Sept.	77.7°	79.3°	80.4°	87.1°	66.6°	80.4°	77.2°	67.8°
Oct.	78.1°	79.5°	80.8°	83.1°	73.4°	78.6°	76.5°	68.9°
Nov.	75.7°	79.0°	80.8°	71.4°	79.7°	72.3°	73.8°	70.5°
Dec.	72.9°	78.1°	80.6°	64.8°	82.8°	66.7°	71.4°	71.8°
Mean	78.6°	78.8°	80.6°	79.3°	70.3°	79.5°	73.9°	71.1°
Range	12.4°	2°	0.7°	32°	33.8°	27.5°	7.6°	10.3°

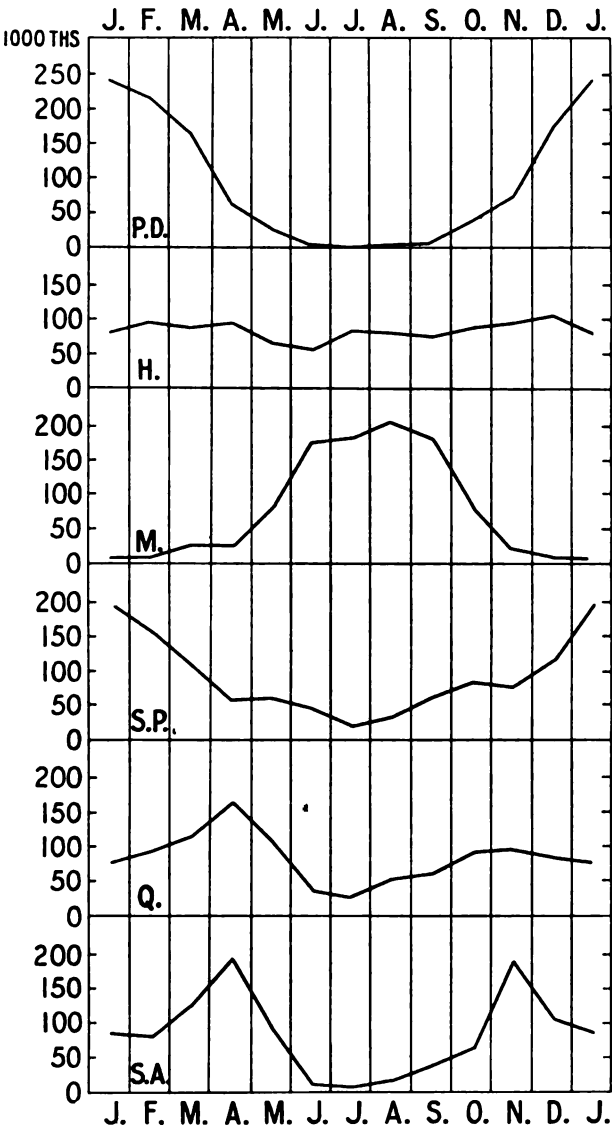
The greatest range is shown in the curve for the interior of Africa; the curve for Batavia illustrates insular conditions with less range, and the oceanic type, for Jaluit, Marshall Islands, gives the least range. At Jaluit the daily maxima for the entire year are between 88° and 91.5° and the daily minima between 75° and 77° . This double maximum is not a universal phenomenon, there being many cases where but a single maximum occurs, as will be seen later.

As the belt of rains swings back and forth across the equator after the sun, there should be two rainy seasons with the sun vertical, and two dry seasons when the sun is farthest from the zenith, and while the trades blow. These conditions prevail on the equator, and as far north and south of the equator (about 10° - 12°) as sufficient time elapses between the two zenithal positions of the sun for the two rainy seasons to be distinguished from one another. In this belt, under normal conditions, there is therefore, no dry season of any considerable duration. The double rainy season is clearly seen in equatorial Africa and in parts of equatorial South America. The maxima lag somewhat behind the vertical sun, coming in April and November, and are unsymmetrically developed, the first maximum being the principle one. The minima are also unsymmetrically developed, and the so-called "dry seasons" are seldom wholly rainless. In this equatorial belt the annual range of rainfall is generally below 20%; in the western portion of the Malay Archipelago and on the upper Amazon it is below 10%. In these latitudes, therefore, the distribution of rainfall is not unlike that in extra-tropical latitudes which are under the marine regime of rainfall, there being precipitation at all seasons.

This rainfall type with double maxima and minima has been called the *equatorial* type, and is illustrated in the following data and curves for South Africa and Quito.*

The mean annual rainfall at Quito is 42.12 inches. These double rainy and dry seasons are easily modified by other conditions, as by the monsoons of the Indo-Australian area, for example, so there is no rigid belt of *equatorial rains* extending around the world. In South America, east of the Andes, the distinction between rainy and dry seasons is often much confused. In this equatorial belt the cloudiness is high throughout the year, averaging .7 to .8, with a relatively small annual period. The data and curve following are fairly typical, but the annual period varies greatly under local controls.

*Given to nearest tenths of a degree Fahr.



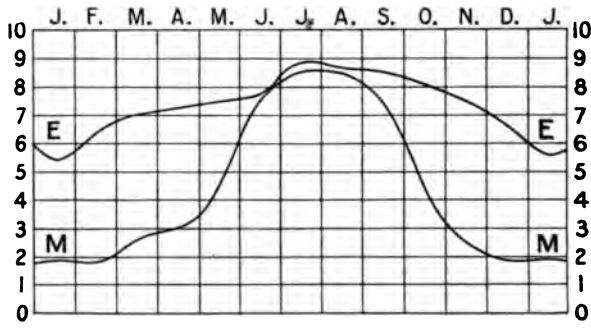
Annual March of Rainfall in the Tropics.

S. A: South Africa. Q: Quito. S. P: Sao Paulo. M: Mexico. H: Hilo. P. D: Port Darwin.

Table Showing Monthly Distribution of Rainfall for Selected Tropical Stations ¹

	Tropics					
	Double Rainy Season Equatorial		Single Rainy Season			
			Margin of Tropics		Trade Rains	Monsoon Rains
			Southern	Northern		
	Southern Africa	Quito	São Paulo	Mexico	Hilo	Port Darwin
Latitude	6°S	Equator	23.5°S	19.4°N	19.7°N	12.5°S
Jan.	86	77	195	7	79	241
Feb.	80	92	156	9	94	215
March	123	115	103	26	86	166
April	195	165	58	26	94	61
May	91	109	60	85	66	23
June	10	35	46	174	55	1
July	7	25	19	180	82	0
Aug.	17	52	31	207	81	2
Sept.	37	60	60	179	73	5
Oct.	61	91	82	79	88	38
Nov.	188	94	74	20	95	72
Dec.	105	85	116	8	107	176

Table showing Monthly Distribution of Cloudiness (in tenths) in an Equatorial Climate. (Cameroons; Gaboon. Lat. 3°N, West Africa.)
Jan. Feb. Mar. Apr. May June July Aug. Sept. Oct. Nov. Dec. Year
5.4 6.3 7.0 7.2 7.4 7.7 8.9 8.6 8.4 8.0 7.4 6.6 7.4



Annual March of Cloudiness in the Tropics.
E: Equatorial Type. M: Monsoon Type.

At greater distances from the equator than about 10° or 12° the sun is still vertical twice a year within the tropics, but the interval between

¹ The figures in this table are thousandths of the mean annual rainfall. In the first column of the table, the average of a considerable number of stations is given.

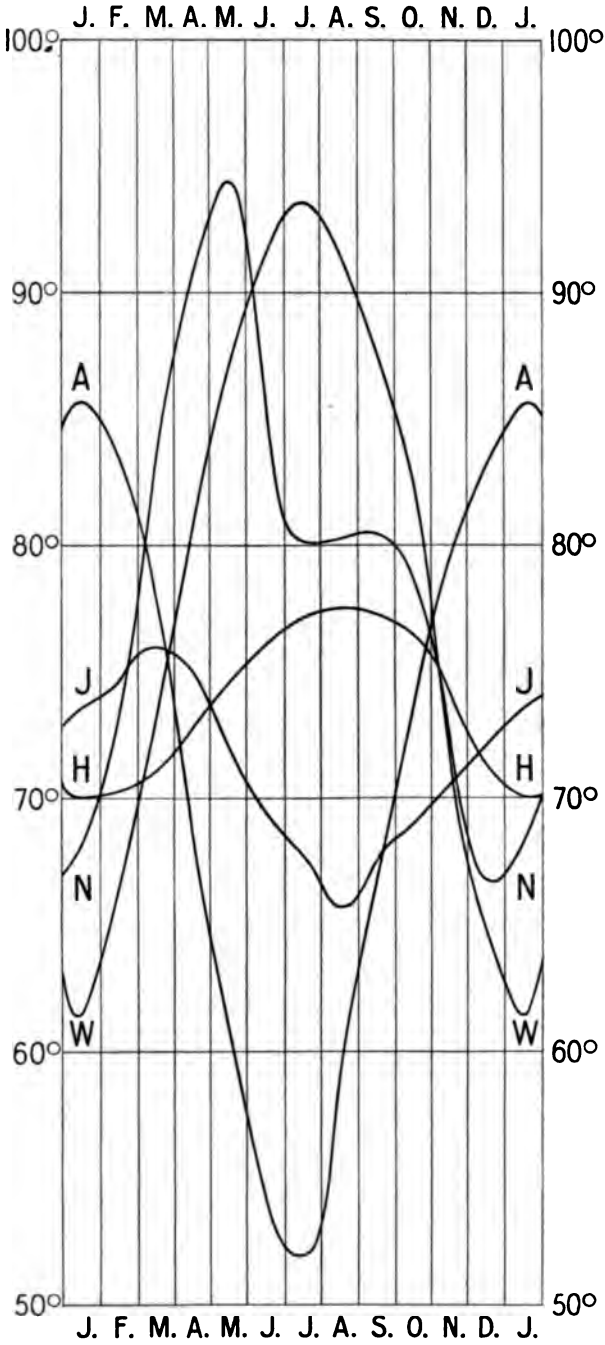
these two dates is so short that the two rainy seasons merge into one, in summer, and there is also but one dry season, in winter. This is the so-called *tropical type of rainfall*¹, and is found where the trade belts are encroached upon by the equatorial rains during the migration of these rains into each hemisphere. It is illustrated in the data and curves for São Paulo, Brazil, and for the city of Mexico (see rainfall table above). The mean annual rainfall at São Paulo is 54.13 inches, and at Mexico 22.99 inches.

The districts of tropical rains of this type lie along the equatorial margins of the torrid zone, outside of the latitudes of the *equatorial type of rainfall*. The rainy season becomes shorter with increasing distance from the equator. The weather of the opposite seasons is strongly contrasted. The single dry season lasts longer than either dry season in the equatorial belt, reaching eight months in typical cases, with the wet season lasting four months. The lowlands often become dry and parched during the long dry trade wind season (winter) and vegetation withers away, while grass and flowers grow in great abundance, and all life takes on new activity during the time when the equatorial rainy belt, with its calms, variable winds and heavy rains, is over them (summer). The Soudan lies between the Sahara and the equatorial forests of Africa. It receives rains, and its vegetation grows actively, when the doldrum belt is north of the equator (May-August). But when the trades blow (December-March) the ground is parched and dusty. The Venezuelan llanos have a dry season in the northern winter, when the trade blows. The rains come in May-October. The campos of Brazil, south of the equator, have their rains in October-April, and are dry the remainder of the year. The Nile overflow results from the rainfall on the mountains of Abyssinia during the northward migration of the belt of equatorial rains.

Simple *tropical* rainfalls, as shown in the above curves, are typical of large areas, but they are not infrequently complicated by association with trade or monsoon rains, as in the West Indies, Central America and India. The true doldrum rains may come along the polar margin of the equatorial low pressure belt, when this belt is moving equatorward, followed by the trades.

The so-called *tropical* type of temperature variation, with one maximum and one minimum, is illustrated in the data given in the table on page 309, and in the accompanying curves for Wadi Halfa, in upper Egypt; Alice Springs, Australia; Nagpur, India; Honolulu, Hawaii, and Jamestown, St. Helena. The effect of the rainy season is often shown in a

¹ Supan calls it the *marginal type of the tropics*.



Annual March of Temperature: Tropical Type.
W: Wadi Halfa. A: Alice Springs. N: Nagpur. H: Honolulu. J: Jamestown, St. Helena.

displacement of the time of maximum temperature to an earlier month than the usual one. During the rains, the temperature is apt to remain constant, as in the case of Nagpur, and of other stations in India, Mexico and the interior of Senegambia. This type of temperature curve is characteristic of most of the tropics outside of the latitudes reached by the equatorial belt.

II. *Trade Wind Belts.* The trade belts near sea-level are characterized by fair weather, steady winds, infrequent light rains or even an almost complete absence of rain; very regular, although slight, annual and diurnal ranges of temperature, and a constancy and regularity of weather which is more truly "temperate" than that of most of the so-called temperate zone. The climate of the ocean areas in the trade wind belts is indeed the simplest and most equable in the world, the greatest extremes—and even these are moderate—being found to leeward of the larger lands, where the continental conditions are carried offshore by the prevailing winds. On the lowlands swept over by the trades, beyond the polar limits of the equatorial rain belt, (roughly between lats. 20° and 30°) are most of the great deserts of the world. These deserts extend directly to the water's edge on the leeward western coasts of Australia, South Africa, and South America. In the two latter regions the desert conditions are further helped by the presence of cold ocean currents offshore. Because of their great extent, these trade wind deserts constitute one of the most important climatic districts in the world.

The ranges and extremes of temperature are much greater over the deserts, especially the continental interiors, than over the oceans of the trade wind belts. Minima of 32° or less occur during clear, quiet nights, and daily ranges of over 50° are common. The midsummer mean temperature rises above 90° , with noon maxima of 110° or more in the non-cloudy, dry air of a desert day. The days, with high dry winds, carrying dust and sand, with extreme heat, accentuated by the absence of vegetation, are disagreeable or even dangerous to life, but the calmer nights, with active radiation under clear skies, are much more comfortable. The nocturnal temperatures are even not seldom too low for comfort in the cooler season, when thin sheets of ice may form. Under the strong insolation by day and the quick cooling by night, rocks in the deserts split and break up. On the whole, however, man is less susceptible to the larger temperature ranges in tropical deserts than to the smaller ones in the equatorial belt, because of the lower relative humidity in the former case. In the trade wind deserts, as in other arid regions, man is nomadic.

While the trades are drying winds as long as they blow strongly over

the oceans, or over lowlands, they contain a large amount of water vapor and readily become rainy if they are cooled during an ascent over a mountain or highland. Hence the windward (eastern) sides of mountains or bold coasts in the trade wind belts are well watered, while the leeward sides, or interiors, are dry. Mountainous islands in the trades, like the Hawaiian Islands, many of the East and West Indies, the Philippines, Borneo, Ceylon, Madagascar, Teneriffe, etc., show marked differences of this sort. The eastern coasts of Guiana, Central America, southeastern Brazil, southeastern Africa, and eastern Australia are well watered, while the interiors are very dry in the two last-named countries. The eastern highland of Australia constitutes a more effective barrier than that in South Africa; hence the Australian interior has a more extended desert. South America in the southeast trade belt is not well enclosed on the east, and the most arid portion is an interior district close to the eastern base of the Andes where the land is low. Even far inland the Andes again provoke precipitation along their eastern base, and the narrow Pacific coastal strip, to leeward of the Andes, is a very pronounced desert from the equator to about lat. 30°S . The cold ocean waters, with prevailing southerly (drying) winds alongshore, are additional factors in causing this aridity. The Peruvian climatic province is abnormally cool. Highlands in the trade belts are therefore moist on their windward slopes—even in deserts mountains provoke local rainfall, tree growth and local streams—and become oases of luxuriant plant growth, while close at hand, on the leeward sides, dry savannas or deserts may be found. The damp, rainy and forested windward (NE trade) side of Central America was from the earliest days of European occupation left to the natives, while the centre of civilization was naturally established on the more open and sunny southwestern side.

The rainfall associated with the conditions just described is known as the *trade type*. These rains have a maximum in winter, when the trades are most active, this being a departure from the general rule of summer rains in the tropics. In cases where the trade blows steadily throughout the year against mountains or bold coasts, as on the Atlantic coast of Central America, there is no real dry season. The data and curve for Hilo (mean annual rainfall 145.24 inches), on the windward side of the Hawaiian Islands, show typical conditions. While the *tropical* rains are convectional, and therefore prefer the warm season, the trade rains are orographic, and have a winter maximum.

The trade type of rainfall is often much complicated by the combination

with it of the *tropical* type and of the *monsoon* type (see next paragraph). Zanzibar, for example, has its principal maximum of rainfall in April, which is pure *tropical*, and has a secondary maximum in December, which is *trade*. Again, on the lee of highlands which receive a winter maximum on their windward slopes, summer rains may occur at the time when the trade is weakest, and the otherwise long dry season is interrupted by scattering showers. In the Malay archipelago there are complications of equatorial and trade rains; likewise in the West Indies. Trade rains often have a tendency to give precipitation both day and night, while torrid zone rains generally prefer the day.

III. *Monsoon Belts*. In a typical monsoon region, such as that of India, eastern Asia and the adjacent islands, the rains follow the vertical sun, and therefore have a simple annual period much like that of the *tropical* type above described, the dry season coming when the sun is lowest (winter). This monsoon type of rainfall is well illustrated in the data and curve for Port Darwin (mean annual rainfall 62.72 inches) in Australia. This summer monsoon rainfall results from the inflow of a large body of warm, moist air from the sea on to a land area; a consequent retardation of the velocity of the air currents, as the result of friction, and an ascent of the air, the rainfall being particularly heavy where the winds have to climb over high lands. Thus, in India, the precipitation is heaviest at the head of the Bay of Bengal, where Cherrapunji, at the height of 4,455 feet in the Khasi Hills, has a mean annual rainfall of between 400 and 500 inches; along the southern base of the Himalayas (60 to 160 inches); on the bold western coast of the peninsula, (80 to 120 inches and over), and on the mountains of Burmah up to 160 inches. In the rain-shadow of the Western Ghats, the Deccan often suffers from drought and famine unless the monsoon rains are abundant and well distributed, and the decreasing rainfall up the Ganges valley leaves the Indus plain with a deficiency (less than five inches). The prevailing direction of the rainy monsoon wind in India is southwest; on the Pacific coast of Asia, southeast. This monsoon district is very large, including the Indian Ocean, Arabian Sea, Bay of Bengal, and adjoining continental areas; the Pacific coast of China, the Yellow and Japan Seas, and numerous islands from Borneo to Sakhalin on the north and to the Ladrone Islands on the east. Where the seasons are clearly defined in India, they are three in number: a cool, dry season (winter) when northerly trade winds prevail, and when there is little or no rainfall except in the northern provinces, where moderate cyclonic storms occasionally occur; a wet season, sultry and oppressive, with the inflowing southwest monsoon of

summer; and a hot dry season before the beginning of the rains. The beginning of the monsoon rains usually comes suddenly ("burst"), with heavy thunderstorms. A typical temperature curve for a monsoon district is that for Nagpur, in the Indian Deccan, and a typical cloudiness curve is given above, the maximum coming near the time of the vertical sun, in the rainy season, and the minimum in the dry season.

Table showing Monthly Distribution of Cloudiness (in tenths) in a Monsoon Climate (Bengal, lat. 23.5°N).¹

Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Year
1.9	1.8	2.6	3.0	4.5	7.5	8.5	8.4	7.5	4.3	2.5	1.8	4.5

In the Australian monsoon region, which reaches across New Guinea and the Sunda Islands, and west of Australia, in the Indian Ocean, over latitudes 0°-10°S, the monsoon rains come with north-west winds in the period between November and March or April. The northern portion of Australia is thus watered by zenithal summer rains, and the southern portions of Sumatra, Borneo and Java are also under the influence of this northwest monsoon. The essential features of the whole Indo-Australian monsoon belt, therefore, are a fairly uniform distribution and small annual range of temperature; and well-marked periodic rains, coming with north-west or southwest winds according to the hemisphere.

The general rule that eastern coasts in the tropics are the rainiest finds exceptions in the case of the rainy western coasts in India and other districts with similar monsoon rains. On the coast of the Gulf of Guinea, for example, there is a small rainy monsoon area during the summer; heavy rains fall on the seaward slopes of the Cameroon Mts. Not far inland, Baliburg shows a double maximum of the equatorial type. Gorée, lat. 15°N., on the coast of Senegambia, gives a fine example of a rainy (summer) and a dry (winter) monsoon. A case of a special kind is the Somali coast, which trends NE-SW and is therefore parallel with both monsoons. Hence at no season can it become very rainy, and mean annual rainfalls of 40 inches are not recorded until the coast takes a turn to the south, at Mombasa.

Numerous combinations of equatorial, trade and monsoon rainfalls are found, often creating great complexity. In the case of Port Darwin the station is near enough to the equator to have two rainy seasons (*equatorial type*) when the sun is vertical, as is frequently the case in the West Indies and Central America in the same latitude. The rainiest month, however, is January, between the two times of vertical sun, but

¹ Five Stations.

during the height of the monsoon, there being a rainy season of four months and a dry season of eight months. The monsoon thus interferes with the typical occurrence of equatorial rains. It is also true that the dry season in monsoon districts is drier than the two dry seasons of the equatorial type. Batavia, on the island of Java, has simple monsoon rains. Buitenzorg, on the same island, has a monsoon maximum in January, two months before the sun is vertical for the first time, and it has a regular tropical maximum of rainfall in October, following the second zenithal position of the sun. The north coast of Ceram, in the Moluccas, has northwest summer monsoon rains, with a maximum in February, while the south coast has winter rains, with the southeast trade. The rainy and dry seasons thus come under different conditions and at opposite times on the two coasts. These two sets of conditions are often very close together, with a divide between them. On the island of Hawaii, Hilo, on the east side, is exposed to the northeast trade and has a winter maximum of rainfall. Kailua, on the lee side, has about one-third as much rainfall, with a summer maximum. The islands of the East Indian archipelago furnish many examples of such curious complications. The eastern coast of Madagascar has southeast trade winds fairly uniformly through the year, while the interior and west coast have a summer maximum—the normal tropical rainfall season.

IV. *Mountain Climate.* In the torrid zone altitude is chiefly important because of its effect in tempering the heat of the lowlands, especially at night. If tropical mountains are high enough, they carry snow the year around, even on the equator, and the zones of vegetation may range from the densest tropical forest at their base to the snow on their summits. The highlands and mountains within the tropics are thus often sharply contrasted with the lowlands, and offer more agreeable and more healthy conditions for white settlement. They are therefore often sought out by residents from colder latitudes as the most attractive resorts. In India, the hill stations are crowded during the hot months by civilian and military officials, and it has been well said that India is ruled from 7,000 feet above sea level. The climate of many tropical plateaux and mountains has the reputation of being a "perpetual spring." Thus on the interior plateau of the tropical Cordilleras of South America, and on the central plateau of tropical Africa, the heat is tempered by the altitude, while the lowlands and coasts are very hot. The rainfall on tropical mountains and highlands often differs considerably in amount from that on the lowlands, and other features common to mountain climates the world over are also noted. But the main emphasis is rightly laid upon the temperature.

WHAT A CHILD OUGHT TO KNOW AT THE END OF HIS SCHOOL GEOGRAPHY COURSE

By WILLIAM CHARLES MOORE

Instructor and Supervisor of Geography, State Normal School, Salem, Mass.

WHAT a child ought to know at the end of his school course in geography concerns both the class-room teacher and the supervisor. The supervisor must have the ultimate aim of the course in mind, and, by a close articulation of the different grades, must make unity of work possible. He should also judge of the relative importance of different topics, so that the work as a whole shall be well balanced. But the actual results will depend in great measure upon the kind of work done by the class room teachers.

Different individuals will, of course, expect different results. In fact, there is much diversity of opinion among general superintendents of instruction as to what should be included within the course of study and in what order it should be taught. Notwithstanding these differences, however, a discussion of what may be expected at the end of the school course in geography ought to establish some common ground of greater or less extent.

One of the most fundamental results to be attained is an understanding of the relation of each individual to his surroundings. This is simply what is expressed, of course, in the usual definition of geography. All education is concerned in general in helping humanity adjust itself in relation to its mental and material environment. Geography not only contributes towards this end in a general way, but it also provides special facilities for the interpretation of the conditions which determine the course and progress of the life of the times.

The basis for this interpretation must be derived by a systematic and progressive study of home geography. The lessons learned from the local features and conditions must not end with the fourth grade, however; to insure the results implied in this article, the geographical types of the home locality should be referred to in every grade. He is a good naturalist who knows his own parish, and a good juvenile geographer is one who has begun to realize how the local hills, valleys, plains, streams, coastal forms, and the prevailing conditions of temperature and moisture have influenced favorably or unfavorably the industrial, commercial, and social development of his own particular part of the world.

A recognition of the geographical bearing of current events brings

the work of the schoolroom into a close, vital relation with the affairs of the outside world. From all parts of the globe the daily papers, the current magazines, and the monthly consular reports bring valuable geographical information. These items vitalize and make real the most important topics in geography. This custom of using current information, if practised in every grade, will help the pupil to realize that the text-book does not necessarily contain the latest or most authentic information. It teaches the pupil to use the atlas, the gazetteer and other sources and it helps to establish a habit which, in the years that follow school life, will tend to keep one's stock of geographical information up to date and available.

One of the most apparent aims in the study of geography is some knowledge of the principal physiographic types in their relation to life. Mountains, lofty and snow-capped, with steep irregular sides, attractive as scenic centers, and those worn down and subdued, useful in furnishing lumber, metals, coal, pasture, and possibly farming lands; valleys, steep sided and narrow, of doubtful value for settlements or for lines of travel, and others, broad and open, with slopes so gentle that, in affording both easy means of transportation and suitable sites for cities, they rival the plains of fluvial, marine, or glacial origin; rivers in different stages of development, some providing natural facilities for moving merchandise and people and others furnishing valuable water power; coastlines that exhibit the principal features of the contact between the land and sea and exemplify the advantages and disadvantages to man of varying degrees of irregularity, —all of these types, which are found throughout the world, are constantly recurring in the different grades and are a source of increasing geographical interest. A comparison of each new example of these different types with those already recognized in the previous grades serves as the very best kind of review. It helps to keep the names and locations of the principal mountain ranges, rivers, plains and coastal forms in mind. At the end of the school course, therefore, it may reasonably be expected that the pupil will have a fair degree of knowledge of the location and characteristics of the principal physiographic features of the world and a keen appreciation of the effect of these factors, individually and collectively, in determining the desirability of the earth for man.

A knowledge of the main facts about climate is another of the more important results to be expected. In every grade from the earliest to the latest, in the geography of the home locality and in the study of distant lands, the prevailing conditions of temperature and moisture are ever-present and important factors. The facts which constitute what is meant

by climate are within the comprehension of every pupil; the explanation of these facts is another thing. To know that water passes into the air in an invisible form is a matter of simple observation and inference; so is the fact that this vapor when cooled sufficiently manifests itself as cloud, fog, dew, frost, rain or snow. A full explanation of the process by which this is brought about is too difficult for the grammar-school pupil, but a knowledge of the facts may reasonably be expected. The effect of latitude and of altitude upon temperature and the modifying influence of the proximity of large bodies of water are elements in the problem of climate which come within the range of the pupil's powers. That the wind is a movement of air caused by difference in atmospheric pressure, which, in turn, may depend upon variations in temperature, is a fundamental fact which leads to an understanding of the planetary circulation of the atmosphere, and finds many illustrations in the work of the different grades. Climate is without doubt one of the most complicated and difficult parts of geography; it is also the most important of the geographic controls. Man has overcome to some extent the limitations imposed by relief and by large bodies of water, but he can never hope, in the open, to defy climatic conditions. Throughout the study of this topic the training in the class-room ought to recognize the importance of making the understanding aid the memory in recalling such matters as the location of the principal heat belts, the circulation of the atmosphere and the distribution of rainfall.

The *facts* connected with the study of what is sometimes called astronomical geography ought to be well in mind at the end of the pupil's course in geography. By some educators the *explanation* of these facts is also attempted. The wisdom of including what is essentially astronomical will depend upon the time at the disposal of the teacher and the proficiency of the class. To introduce the *explanation* of the variation in the length of daylight and darkness and the change in the angle with which the sun's rays strike different portions of the earth at different seasons, in the fifth or sixth grades, or perhaps the seventh grade, as it is frequently done, is almost a waste of time. Facts themselves are matters of observation, pupils of all ages may be expected to see things; the explanation of what is observed, however, demands an exercise of the reasoning powers and this must wait for the development of the pupil's mind. The memorization of the teacher's explanation, expressed though it may be in words of the simplest character, does not necessarily imply understanding. The alternation of day and night is something within the experience of the most elementary pupil and its explanation involves simply turning a globe held in the sunlight. It is taken for granted, therefore, that the rotation of

the earth upon its axis and the attendant consequences will be familiar facts. Other facts, which in themselves are matters of seasonal or even daily occurrence in the lives of the pupils, and which, therefore, everyone ought to know something about upon the completion of the course of study, are the diurnal paths of the sun at the time of the solstices and equinoxes as observed in the home latitude, the variations in the length of daylight and darkness, the diurnal and seasonal ranges of temperature for the locality in which the individual lives and the relation of temperature to length of day and inclination of the sun's rays.

These observations will lead naturally to the memorizing of other facts not within the pupil's own experience, like the position upon the earth's surface of the sun's vertical rays at different times of the year, the consequent location of the Tropics of Cancer and Capricorn, and the seasonal shifting of the heat equator and zones of heat.

The map and the globe are among the most important sources of geographical information. But the usefulness of the globe in showing, among other things, the relative position and size of countries and continents is too seldom recognized, and the school-room map is usually poor. A greater number of facts and relations can be presented at once to the eye by a good map than could be gained by hours of study of lengthy verbal descriptions. To be able to read contour maps of large scale, like those of the U. S. G. S., to interpret the best wall maps intelligently, and to draw simple sketch maps of the continents ought to be among the most valuable results of a school course in geography.

The study of maps means something more than location. Most maps, however, with which pupils become familiar in their school course are not of much use for any other purpose. They show principally the outline of the continent, the boundaries of the political divisions, the location usually of too many cities and little more than the position of the mountains, rivers, lakes and coastal forms. The best maps show variation in altitude by different colors, or a scale of tones of the same color, intensity of relief by hachure lines and differences in the depth of the sea in tints of blue. Upon these maps the continents are presented with the third dimension, not in terms of plane figures. A map which does not show elevation, within a reasonable degree of accuracy, neglects to present an important factor of both relief and climate—the two most fundamental things upon which the usefulness of the earth for the home of man depends.

The familiarity with the map which the pupil ought to carry away with him at the end of his school course is something different from an acquaintance with the names of the capes, bays, peninsulas, the boundaries

or countries and State or the location of capitals and principal cities. Location, by the way, is best learned incidentally. For example, a familiarity with the position of the surface features in one's home locality is gained, not as the result of direct effort with the local map, but by frequently coming into relation with them in the every-day affairs of life. So, too, the location of distant places is learned most effectively and naturally through the frequent associations and comparisons that form the basis of the best teaching. It is not a knowledge of location alone, therefore, which the pupil should possess but the ability to understand from a set of symbols the present or possible future relations of different portions of the earth to man. It is, in brief, the power to read from the map the physiographic and climatic conditions which affect the distribution of the world's population.

A knowledge of latitude and longitude is essential for the intelligent appreciation of any map. These terms ought by constant drill to mean something real and definite to the pupil so that when the formal school work is over the individual will use them easily and naturally. Too often, however, latitude and longitude are abstract things. This method of locating a place is made necessary by the spherical form of the earth. In no other way, in fact, can location upon the earth's surface be accurately determined. Expressing the position of a continent, country or city in terms of latitude and longitude ought to recall the relation of the map to the globe and the location of the place named in the world as a whole.

Throughout the work in geography the human element is a most important factor. The relation of relief and climate to man's occupation of the earth has already been dwelt upon. The life of the world depends not only upon the physical surroundings but also upon the characteristics of the people. One of the results of the school geography course, therefore, ought to be an acquaintance with the characteristics of the different races, states of society, forms of government and leading industries. In this study of the sociological conditions, as in the work with physical features, good examples of types are constantly occurring through the different grades. When the pupil reaches the last year in geography his previous training ought to have provided a good basis for the intelligent study and appreciation of the leading political institutions and the relation of a good government to industrial and commercial conditions.

To summarize: the results to be expected at the end of the course include principally a knowledge of those fundamental things which occur in some form or other in the legitimate work of nearly every grade. Consequently the more characteristic features, as a result of being approached

from different points of view, at different times and in different ways, ought to become almost as familiar to the pupils as the multiplication table. The details of the work, which of course are indispensable for a lucid presentation of the main facts, will, it is expected, be forgotten. Indeed this is as it should be for then there is an opportunity for what is really important and characteristic to stand out in the memory. In general, it may be said that the study of geography in school ought to contribute towards developing the pupil's geographical sense or instinct. It ought to enable the individual to obtain the highest kind of satisfaction out of travel, and it ought to prepare the citizen in a measure to anticipate or predict the geographical possibilities and probabilities of different localities industrially, commercially and as dwelling places. Briefly, the things which have been suggested in the preceding paragraphs are the fundamental facts which form the basis of the geographical part of a good education.

THE IMPROVEMENT OF SCHOOL GEOGRAPHY.

Actual accomplished improvement in school geography can only be brought about by the teachers who perform the class-room work. It is more than gratifying therefore to find such interest in one of the most difficult subjects of the school curriculum that teachers make special efforts to study the subject and the teaching of the subject with a view to making their work more effective.

A Teachers Geography Club, organized several years ago in Boston, has done effective work among a small body of teachers. This year the club finds such interest in the subject that meetings will be held fortnightly. The Geographic Society of Chicago also reports widespread interest in geography among the teachers of that city and a club for the study of geography has recently been formed among the teachers of Buffalo.

All these signs of awakened interest indicate that, in spite of the progress of the last twelve years, teachers recognize that geography teaching is far from being what it ought to be and that improvement is being made so rapidly in the texts and courses of study that constant study is necessary to keep abreast of a subject, which, stagnant for a generation, has recently proved one of the most active subjects in the school curriculum.

EDITORIAL

NATHANIEL SOUTHGATE SHALER

THE death of Professor Nathaniel Southgate Shaler, on April 10 last, has brought vividly to the minds of many of the geography teachers of the country and to hosts of others the question as to what makes a man or woman a great teacher. The more than five thousand students who had voluntarily come under his influence in his classes, are by their very number a witness to the fact that Professor Shaler was, unlike many teachers, not a mere imparter of information, a hearer of lessons, or a lecturer who slowly and begrudgingly traversed the well worn path of previous years. These students were led to his classes by the tradition that had existed for several college generations that everyone ought to take at least one course with Professor Shaler, "not so much for the subject as for the man." This tradition was founded on the knowledge which gradually grew stronger as the successive classes came and went, that here was a man who taught because he loved to teach, and hence taught well; who was filled with interest in young men, and hence fitted his subject to his hearers and not his hearers to his subject; who had a keen knowledge of human nature that enabled him quickly to fathom the thoughts and feelings of his young friends, and hence to gain their confidence as well as their esteem.

The students who sat under Professor Shaler felt, as they had every right to feel, that their teacher was their friend, who would gladly discuss with them the affairs of their life and give them advice and help from the fullness of his experience at any time. They listened to him as he told them the story of the earth and made it personal, until as the weeks went on they found that they were gaining an insight into the world about them which was not merely something new, but different from anything that could be gained from books or from reading. Many were led, because of their teacher's inspiring leadership, to look further and deeper into the subject and to follow the science of geology as a profession just because their first introduction to the science was made so mind-opening. The large majority went forth from his classes broader in their mental vision, more in sympathy with nature, more keen to analyze the problems of science presented to them daily, and with a deep conviction that they had gained a mental altitude that gave them a broader and more human outlook on the world. These thousands felt, as they heard the sad news of Professor Shaler's death, that they had lost a near personal friend, and that one of

the strongest personalities associated with their memories of their Alma Mater had passed away, and that the college would ever be different to them in subsequent visits.

Those who had come more closely in contact with Professor Shaler, who had been with him day after day for several years, felt that the world had suddenly stopped for a brief moment and that their lives would be different ever afterwards. They could not believe the sad news; and, as they looked back over their many years of friendship and association and analyzed the question as to what it was that made Professor Shaler so dear to them, saw that the growth of their esteem had been through several stages. As youths they were inspired by his wonderful exposition in the class-room, and by his deep love for all that was noble and pure; as the years went on they came to love him because of his breadth of sympathy, his versatility and his nobleness, which could not be appreciated in early acquaintance because their knowledge was not deep enough. Those who knew him longest loved him because of all these qualities and many others that became deeper and richer as the years advanced. Above all and through all shone the deep humanity of the man, evidenced in his every thought, suggestion and act. It was this deep human interest in and sympathy with all phases of life and endeavor that made him a man so far different from his fellow-men and beloved by all who knew him—and many who did not. He was a splendid example of the fact that great teachers are, above all, great men and women, and that the personality of a teacher is a more vital asset than his learning or his training in the ways of teacher. Professor Shaler was a great teacher because he was primarily a broad-minded, big-hearted man, vigorous of speech, keen of mind, quick of action, versatile beyond belief almost, always interested in everything about him however remote or seemingly trivial. He sacrificed his strength in every way in the service of his fellows; but his influence will go on through the generations, by his books and writings, but more especially by the teachings of those he taught to teach, by example. Professor Shaler was very fond of quoting, with deep reverence and feeling, "My master, Louis Agassiz." He leaves behind a vast number of students who feel equally keenly that Professor Shaler was their master and who will reverence his memory as they will never forget his example or lose the influence of his inspiration.

RICHARD ELWOOD DODGE.

RECENT PUBLICATIONS

GEOGRAPHEN-KALENDER, 1906-1907. By Dr. Hermann Haack; pp. 571 with 16 maps. Gotha. Justus Perthes, 1906.

The fourth annual Geographen-Kalender, like its predecessors, is a necessary reference volume for geographers and should be in all first-class libraries. The current volume, besides the usual tables and statistics, includes a summary of the chief geographical events for 1905, a brief but well-arranged bibliography for the same year, short notices of the eminent geographers who died in the year under review, and a reference list of the geographical institutions and periodic publications of the world.

STATESMAN'S YEAR BOOK, 1906. By J. Scott Kellie and I. P. A. Renwick; pp. 1,604, with maps. Macmillan and Company, 1906.

The Statesman's Year Book each year becomes more indispensable as a book of reference for all, but especially for geographers, editors and teachers. It is a digest of the world's financial, economic, political and social condition, prepared in such a form as to be readily used and easily consulted. It is the one authority to which to turn for the latest information about any place or geographic fact. The edition for 1906 is especially valuable because it contains a much amplified account of the United States. For the first time each State in the Union is given separate treatment, the summary in each case being topical and including a statement of the form of government, the area and population, the schools and colleges, the courts and public institutions, the financial condition, the National Guard, the chief products and industries, the deposits in banks and a list of books of reference.

THE PHYSICAL GEOGRAPHY, GEOLOGY, MINERALOGY AND PALAEONTOLOGY OF ESSEX COUNTY, MASSACHUSETTS. By John Henry Sears; pp. 418 with map. The Essex Institute, Salem, Mass., 1905.

A very complete account of a small but geographically interesting area. An excellent illustration of the possibilities in the way of local study and publication. The author has spent many years mastering the minutiae of his subject and becoming familiar with almost every square foot in the territory. A monument to industry and patience. Excellently illustrated and attractively printed.

GEOGRAPHY OF NEBRASKA. By George E. Condra; pp. 192. The University Publishing Co., Lincoln, Nebraska, 1906.

A brief but authoritative geography of Nebraska, "written for school boys and girls," includes the geology, climate, drainage, surface features, and economic conditions of the State. Matter well chosen and well presented. The many excellent illustrations are often of little service because poorly reproduced.

GEOGRAPHICAL GLEANINGS. By Frank R. Barrows; pp. 75. George Philip and Son. London, 1906.

Includes two parts entitled, On Some Methods of Teaching Geography and On the Preparation and Teaching of the Subject. Suggestions for Fellow Teachers.

The second part is a good summary of the necessary training and point of view of a good teacher of geography and includes valuable suggestions as to equipment. The author summarizes his propositions by a series of outlines of lessons on India. Practical, suggestive, stimulating.

- A PROGRESSIVE COURSE OF COMPARATIVE GEOGRAPHY ON THE CONCENTRIC SYSTEM. By P. H. L'Estrange; pp. 146, including 172 maps. George Philip and Son. London, 1906.

A combined atlas and text-book, exploiting how to teach geography "to stimulate the learner's reason rather than to train his memory." Divided into two parts, the first including the Principles of Geography and the second being devoted to Regional Geography. In each subdivision of the second part a definite causal order is followed working from the general to the detailed. The special feature of the book, as compared with its English rivals is the large number of excellent maps so arranged as to be used as a basis for a causal study of the subject matter. These maps are of good scale, clear and pleasing. They are worthy of being used for reference by American teachers. Each chapter is divided into three parts so as to be adaptable to students of different stages of advancement. The plan is such that the book cannot well be used as a text outside Britain, but as an example of progress and of a rational method of teaching geography to advanced pupils it deserves favorable commendation and wide usage.

A REAL KNOWLEDGE OF GEOGRAPHY.

A real knowledge of geography embraces at once a knowledge of the earth and of the dwellings of man upon it. It stretches out one hand to history and the other to geology and physiology. It is just that part in the dominion of knowledge where the students of physical and of moral science meet together. Let one understand the real geography of a country, its organic structure if I may so call it; the form of its skeleton, that is, of the hills; the magnitude and course of its veins and arteries, that is, of its streams and rivers; let one conceive of it as a whole made up of connected parts; and then the position of man's dwellings, viewed in reference to these parts, becomes at once easily remembered, and lively and intelligible besides.

THOMAS ARNOLD.

NOTES

"ANALYSIS OF THE COMMERCE OF THE UNITED STATES WITH THE VARIOUS COUNTRIES OF THE WORLD."—"Analysis of the Commerce of the United States with the Various Countries of the World" is the title of a monograph just issued by the Department of Commerce and Labor through its Bureau of Statistics. The purpose of this monograph, as the title implies, is to show the articles forming the trade with each country of the world, article by article, during a term of years. The tables show the principal articles forming the imports from and exports to each country in each year from 1895 to 1905. The foreign commerce of the United States has grown during that period from 1,540 million dollars to 2,636 millions, an increase of 71 per cent; the imports have grown from 732 millions to 1,118 millions, an increase of 53 per cent, and the exports from 808 millions to 1,519 millions, an increase of 88 per cent.

Considering the growth by groups of articles, the figures show that the importation of food and live animals increased 17 per cent during the period named; crude articles for use in manufacturing, 93 per cent; articles manufactured wholly or partially for use in manufacturing, 72 per cent; articles manufactured ready for consumption, 19 per cent; and the group entitled "Articles of voluntary use, luxuries, etc.," 58 per cent. In exports, the group entitled "products of agriculture," increased 48 per cent; manufactures, 196 per cent; products of mining, 175 per cent; products of the forests, 117 per cent; products of the fisheries, 36 per cent, and the group entitled "Miscellaneous," 66 per cent.

Considering the commerce by grand divisions, trade with Europe shows an increase of 41 per cent in imports therefrom and 63 per cent in exports thereto; in the trade with North America the imports increased 70 per cent and the exports 140 per cent; with South America the imports increased 34 per cent and the exports 70 per cent; with Asia the imports increased 109 per cent and the exports 642 per cent; with Africa the imports increased 58 per cent and the exports 162 per cent, and with Oceania the imports increased 46 per cent and the exports 152 per cent.

It is in the details of trade by articles with the various countries of the world that the statements are especially interesting and important. They show the principal articles forming the trade with each country in each year during the period in question (1895-1905). The United Kingdom stands at the head of the list of the countries from which the imports are drawn and also at the head of the list to which the exports are sent.

The imports from the United Kingdom, which amounted to 172 million dollars in 1905 increased only 13 million dollars, or about 8 per cent, during the decade. Manufactures of fibers, cotton, wool, silk and iron and steel are the largest items of the imports from the United Kingdom, and in many of the items under these heads there are considerable increases in 1905, as compared with 1895, but in others there are marked decreases.

On the export side the United Kingdom also heads the list with an increase of 136 millions, a gain of 35 per cent during the period. Cotton, breadstuffs, provisions and cattle, lumber and timber, and manufactures of iron and steel of various kinds, copper, etc., form the largest items in the export trade to the United Kingdom, and in practically all of these there is a growth during the decade, especially in the later forms of iron and steel manufactures, such as electrical machinery, metal-working machinery, typewriters, and builders' hardware.

Germany stands second in the list of countries from which imports are drawn, the total having grown from 81 millions in 1895 to 118 millions in 1905, an increase of 37 millions during the decade, or 46 per cent. The most important articles imported from Germany are chemicals and dyes, cotton manufactures, iron and steel manufactures, paper, and the manufactures of wool, silk, cotton, and fibers, many of which show an increase in 1905 compared with 1895. The exports to Germany, which grew from 92 millions to 194 millions, an increase of 102 per cent during the period in question, consist chiefly of raw cotton, breadstuffs, provisions, manufactures of iron and steel, mineral oils, copper and other articles of this character, nearly all of which show a growth during the decade.

Brazil ranks third in the statement of imports, the value of importations from that country having grown from 79 millions to 100 millions during the period in question, the principal articles forming this large total being coffee and india rubber, while the exports to Brazil show a loss during the period, having amounted in 1905 to but 11 million dollars against 15 millions in 1895. Canada stands third in the list of countries to which exports are sent, the increase during the decade being about 88 millions, or 166 per cent, while the imports from Canada show an increase of 71 per cent during the same period.

Exports to China and Japan show a larger per cent of increase than to any other of the principal countries, the total value of exports to China having grown from 3½ millions in 1895 to 53½ millions in 1905, an increase of about 1,400 per cent, while to Japan the increase is from 4½ millions to 51½ millions, a gain of about 1,024 per cent. The exports to Mexico show an increase of over 200 per cent and those to Cuba and to

Australia also about 200 per cent each. On the import side the importations from Mexico show an increase of 197 per cent, from Netherlands and Belgium 155 per cent, from India 152 per cent, Cuba 63 per cent, France and Germany 46 per cent each, and those from the United Kingdom an increase of 8 per cent.

TIERRA CALIENTE.—The Tropics of Mexico, or what is termed the Tierra Caliente, embrace about two degrees of latitude. There exist three districts or marked zones of vegetation, whose limits agree in general with the variation of the soil, or in some of the other physical agents, that influence the development of the vegetable species.

In traversing from north to south the first zone encountered extends from the shores of the Atlantic (Gulf of Mexico) to the foothills. The second zone comprises the mountain region, and the third zone extends from the southern limit of the mountainous region to the Pacific Ocean.

The first zone is characterized by the grandeur and variety of the forms of vegetable life. It can be said that as a whole it is an uninterrupted forest (except in certain portions). The plants which constitute the vegetable life are in the majority of a tree-like nature and are conspicuous for the development of their trunks and ramifications.

The innumerable species of reeds and creeping plants, that entwine themselves in a thousand different ways among large, tree-like plants, make an entrance to this exceptionally fertile region almost impossible in the broadest sense of the word. The aspect of this forest is always gay and very verdant and is not affected by the change of season.

Everything in this zone reveals abundant nutrition and circumstances highly propitious for the development of the organized beings of the vegetable kingdom.

In the second, or mountainous zone, the vegetation has lost its tropical characteristics which mark the two opposite zones, as is proven by the presence of oak and pine timber, although the vegetation of the intermediate zone is highly exuberant, and the forests are more or less accessible, because the number of creeping plants, the principal obstacle to the entrance of the forest of the first mentioned zone, has diminished in a notable manner.

In the third zone, which comprises the plants of the Pacific, the vegetation by no means presents the grandeur of the plains of the Atlantic or Gulf zone, although the temperature is essentially tropical. Many circumstances which influence the development of the vegetation are here wanting.

It will be noted that the stately trees with their dark-green foliage have been replaced by the bluish mimosas, and other plants of the fiber family. In this zone the phenomena of vegetation are also paralyzed during a large portion of the year—not on account of the cold, which is never felt in this zone, but on account of the great drought that exists during the three winter months, and the first and second months of the spring.

The cause of the difference just mentioned in the three zones is principally to be found in the manner in which the physical agents of the vegetation act in each of the above zones, the nature of the soil, exposure, degree of temperature, humidity, etc.

The long chain of mountains, that crosses the two Americas in its length, and traverses the Tropics, affords passes connecting the two oceans. The southern slopes of these mountains are very steep, while on the contrary the northern slopes gradually descend toward the plains of the Atlantic.

The predominating winds are from the north and northeast on account of the currents of the Gulf of Mexico, and the difference of temperature to be found in the plains at either extremity, and the north-northeast winds predominate all the year. The temperature on the south side is higher than on the north side, with the exception of April and May, in which the south winds blow quite freely.

The medium temperature in the different regions of the Tropics of Mexico differs more than one might expect, taking into consideration only the variations of altitude and latitude. The Pacific zone has a higher temperature than either of the other two, not only because of its direct exposure to the south, but because it is protected towards the north by the chain of mountains, which form a natural wall, and on account of other particular circumstances which cause it.

Its vegetation is more or less languid during the greater portion of the year. The plants are almost naked and permit the rays of the sun to penetrate the soil which absorbs them and in part reflects them toward the atmosphere, the dryness of which is in contrast with the two other regions of the tropics.

Although the winds that almost constantly blow from the north and northeast tend to somewhat lower the temperature of this zone, their influence is less than it should be because of vapor with which they are loaded on entering the tropics, which they gradually lose in the form of rain in traversing the plains of the northern slopes of the mountains. The small amount of humidity which the air retains, on entering the dry

atmosphere of the Pacific plains, far from precipitating, rises and quickly scatters in proportion to its progress in said plains.

It is frequently seen that an abundance of rain falls on the northern side of the mountains while not a drop falls at the foot of the southern slope of this mountain chain.

The temperature of the plains of the Pacific is very uniform. The monthly average temperature runs from 77° to 85° Fahr. and is from 8° to 11° Fahr. higher than on the Atlantic or Gulf coast.

In the Tropics of Mexico there seems to be an average change of about 1.8° Fahr. either higher or lower, as the case may be, for each 60 feet of altitude.

In the same degree with the temperature the quantity of rainfall varies in the natural divisions of the tropic; the months of the rainy season are when the sun is north of the Equator. The summer months are termed the rainy season. However, during the "northerners" that blow down the coast, it rains with more or less frequency on the plains of the Atlantic and in the mountainous portion of the Tropics.

Usually what is termed the rainy season begins early in June and ends in October. The rainfall is the heaviest and most frequent during the night time and is in the form of heavy showers, then clearing up bright and sunny; while in the winter time, when the "northerners" prevail and produce a rainfall, the rains are steady and may last one, two or three days in succession, accompanied by heavy clouds.

The plains of the Pacific constitute one of the regions in which it rains but little. The rainy season is from June to September. Even during this time the rain is not so frequent nor as abundant as in the Atlantic zone.

To the difference in the climate in the three great natural divisions of Tropical Mexico there must be added the difference existing in the nature of the soil.

On the Atlantic slopes the rainfall washes down refuse from the mountains, which, with the layers of vegetable mold provided by the constant decomposition of vegetable matter which is naturally to be found on the surface of the soil, forms a layer of ground from eight to fourteen feet in depth, very rich in the organic principles which form the principal food of the vegetable kingdom.

In the central division of the Tropics the soil is sandy in some parts and loamy in others and almost as rich as in the region first described. The richness of soil is particularly noted in the mountains, where the exuberant vegetation preserves the ground constantly in a humid state.

The exposed parts are more or less sterile and are best suited for growing certain species of grasses which form the principal feed for cattle, which thrive in this zone. On the plains of the Pacific Coast the soil is sandy and slightly loamy, which in the larger part is accompanied by a certain quantity of lime on the river banks, overflowed lands and other parts where the water is deposited during the rainy season. The layers of vegetable humus, not so thick or as rich in organic matter as in the Northern zone, are generally thinner and contain less fertilizing strength in proportion to the minor quantity of vegetable and animal matter to be found here in deposit.

Although these plains are situated almost at sea level, like the plains of the Atlantic, and are also crossed by divers streams, these latter do not cause inundations, which annually leave behind them great quantities of highly fertile land, as is the case in the Atlantic zone. The reason for this is to be found in that the quantity of water these rivers receive is smaller than that received by the streams of the northern slope of the mountains, and because their beds are not as narrow as those of the Atlantic, and because the filtration which takes place on account of the nature of the soil is so considerable that a river of medium size completely dries out during the months of April and May, up to about eight or twelve miles of its mouth. With the exception of the river Tehuantepec, which flows directly into the Pacific, all the others flow into the interior lakes of that region, some two or three miles from the Pacific Ocean, so they traverse but a short distance of the plains.

Heat and humidity, the principal agents of vegetation, work incessantly and with great intensity on the plains of the Atlantic. The soil is always conserved in a humid state, not only on account of the water, which falls in the form of rain during the greater number of months of the year, but also deposited, in the form of dew, upon the bodies to be found in free air. The abundance of the latter is particularly notable in the hottest months of the year, during which time its formation is greatly favored by climatic conditions. In reality, during these months, the sky is generally clear and the nocturnal irradiation produces a fall in the temperature in these bodies which have a considerable power of emission, as, for example, a kind of vapor of water contained in the air condenses on the leaves of plants. In the north and center of the Tropics, this condition is sufficient to irrigate and keep the ground from becoming absolutely dry, even during the winter time when the rainy season is over. The uninterrupted action of heat and humidity brings with it the continuity of the phenomena of nutrition, the immediate consequence of which is the incessant forma-

tion of the elementary organs. These agents must produce a rapid growth and development in the plants under their influence. The luxurious foliage, constantly shown by the plants of the Atlantic Zone, the thickness and height attained by their trunks, are proof that the nutritious sap flows without cessation, the robustness of the vegetable kingdom being the best testimony. The tree growth in this portion of the tropics is most excellent for construction. They grow to very great dimensions, as shown by the large canoes made from the single trunks of trees, which form the native means of river transportation. The mahogany, cedar, rosewood, the dye woods and many other hard and soft woods, of which many are practically indestructible when set in the ground, grow in the Tropics, as well as the full equivalent of the hard and soft woods of the countries around the Great Lake regions of the Northern portion of the continent which are so greatly in demand in the manufacture of vehicles, furniture and finishing woods.

With the exception of the sandy shores of the Gulf of Mexico the entire plains of the Atlantic are formed of alluvial soil, extraordinarily fertile and suitable for the cultivation of all tropical and sub-tropical products adapted to this climate.

These plains are only awaiting the hand of man, in order to recompense him on a very ample scale for any toil or capital he may invest.

In the center or mountainous region the humidity exercises the same influence as in the northern region, but not so the heat, which works here with less intensity, owing to the difference in temperature before mentioned. The vegetation loses its tropical character. The oak and pine here take the place of the mahogany and cedar. The pine, on account of its great development and length of trunk, furnishes magnificent ship masts, and is likewise advantageously employed in all kinds of naval construction. The predominance of the pine and oak is so much more noticeable for the reason that these species grow together, occupying tracts of large dimensions.—*Modern Mexico.*

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THE CHARACTERISTICS OF THE ZONES. II.—THE TEMPERATE ZONES*

By ROBERT D&C. WARD
Harvard University

Synopsis

General: "Temperate" zones.—Temperature—Pressure and Winds—Rainfall—Humidity and Cloudiness—Seasons: their effects on man—Weather—Climatic subdivisions—South temperate zone—Sub-tropical belts: Mediterranean climates—North temperate zone: Western coasts—Interiors—Eastern coasts—Mountain climates.

General: "Temperate" zones. The so-called "temperate" zones occupy about one-half of the earth's surface. As a whole, they are *temperate* only in that their mean temperatures and their physiological effects are intermediate between those of the tropics and those of the polar zones. The north temperate zone includes the greatest known extremes of temperature. If the use of the word "temperate" were not so firmly established, it would be well to change the name to *intermediate*, or to *middle*.¹

A marked changeableness of the weather is a striking characteristic of these zones. Apparently irregular and haphazard, these continual weather changes nevertheless run through a fairly systematic series, although they are essentially non-periodic. Climate and weather are by no means synonymous over most of the extra-tropical latitudes.

Temperature. The mean annual temperatures at the margins of the north temperate zone differ by more than 70°. The ranges between the

* See this *Journal*, p. 302 for Part I.—*The Tropics*. This article is intended to give an outline only. For further general information reference may be made to the world charts of temperature, winds, cloudiness, rainfall, etc., given with greater or less completeness in the various text-books of meteorology, and, very fully, in the *Atlas of Meteorology*. Detailed information must be obtained from special studies of local climatology.

¹ North-middle and south-middle would then distinguish the zones in the two hemispheres. (See W. M. Davis: *The Temperate Zones*, this *Journal*, Vol. I, 1897, 139-143.) "Temperate" does, however, apply fairly well to the south temperate zone.

mean temperatures of hottest and coldest months reach 120° at their maximum in northeastern Siberia, and 80° in North America. A January mean of -60° and a July mean of 95° , and maxima of over 120° and minima of -90° , occur in the same zone. In the districts of lowest winter minima the mean summer temperatures exceed 85° , and in portions of the districts of highest mean summer maxima the mean winter minima fall below 32° . Such great ranges characterize the extreme land climates. Under the mild influence of the oceans, the windward west coasts have much smaller ranges than the interiors; the seasonal differences increase inland. The annual ranges in the middle and higher latitudes exceed the diurnal, the conditions in much of the torrid zone being exactly reversed. Over much of the oceans of the temperate zones the annual range is less than 10° . In the south temperate zone there are no extreme ranges, the maxima, slightly over 30° , being near the margin of the zone in the interior of South America, South Africa, and Australia. In these same localities the diurnal ranges rival those of the north temperate zone.

The northeastern Atlantic and northwestern Europe are about 35° too warm for their latitude in January, while northeastern Siberia is 30° too cold. The lands north of Hudson's Bay are 25° too cold, and the waters of the Alaskan Bay 20° too warm. In July, and in the southern hemisphere, the anomalies are small. The lands which are the center of civilization in Europe average too warm for their latitudes. The diurnal variability of temperature is greater in the north temperate zone than elsewhere in the world, and the same month may differ greatly in its character in different years. One winter in higher latitudes may have much snow, and temperatures below normal; the next may give much rain instead of snow, and the ground may remain unfrozen. One summer may be very favorable for crops; the next may give a poor harvest.

From the point of view of temperature, these zones may be considered in three divisions: (1) the subtropical, (2) the "temperate" latitudes, and (3) the sub-polar. The annual temperature curve has one maximum and one minimum. In the continental type, the times of maximum and minimum are about one month behind the maximum and minimum insolation dates. In the marine type, the retardation may amount to nearly two months. Coasts and islands have a tendency to a cool spring and warm autumn; continents, to similar temperatures in both spring and fall.

Pressure and Winds. The prevailing winds are the "westerlies," which occupy about as much of the earth's surface as do the easterly trades. The westerlies are, however, much less regular than the trades. They vary greatly in velocity in different regions and in different seasons, from

a light wind to a gale of fifty or more miles an hour. They are stronger in winter than in summer. They are much interfered with, especially in the higher northern latitudes, by seasonal changes of temperature and pressure over the continents, whereby the latter establish, more or less successfully, a system of obliquely outflowing winds in winter and of obliquely inflowing winds in summer. On the eastern coast of Asia there is a complete reversal in wind direction at the opposite seasons, but usually the seasonal shift is much less than 180° . In summer, when the lands have low pressure, the northern oceans are dominated by great oval areas of high pressure, with outflowing spiral eddies, while in winter, when the northern lands have high pressure, the northern portions of the oceans develop cyclonic systems of inflowing winds over their warm waters. All these great continental and oceanic systems of spiraling winds are important climatic controls.

The westerlies are also much confused and interrupted by storms. Hence their designation of stormy westerlies. A constant succession of cyclones, and the accompanying anti-cyclones, traveling along with the prevailing westerlies, cause the latter very frequently to change direction in order to become part of a cyclonic or an anticyclonic whirl. In these storms, velocities of eighty or more miles an hour may be reached at sea. So common are such interruptions that the prevailing westerly wind direction is often difficult to discern without careful observation. Cyclonic storms are most numerous and best developed in winter. The irregular pressure changes during the passage of high or low pressure areas usually wholly mask the faint diurnal variation of the barometer which is so characteristic of the tropics, and which becomes less and less marked with increasing latitude. Although greatly interfered with near sea level by continental changes of pressure, by cyclonic and anticyclonic whirls, and by local inequalities of the surface, the eastward movement of the atmosphere remains very constant aloft. The drift of the higher clouds, and wind observations on mountains, show clearly that the upper currents blow with great steadiness from westerly points, the departures being temporary, and under the control of passing cyclones or anticyclones. The south temperate zone is chiefly water. Hence the westerlies are but little distorted by continental effects. They are strong and steady, and almost as regular as the trades. "Roaring forties" is a well-known designation for the southern middle latitudes, and between latitudes 40° and 60° S. the "brave west winds" blow with a constancy and a velocity found in the northern hemisphere only on the oceans, and then in a modified form. Storms, frequent and severe, characterize these southern hemisphere westerlies,

and easterly wind directions are temporarily noted during their passage. Voyages to the west around Cape Horn against head gales, and in cold, wet weather, are much dreaded. South of Africa and Australia, also, the westerlies are, remarkably steady and strong. The winter in these latitudes is stormier than the summer, but the seasonal difference is less than north of the equator.

Between trades and westerlies lies a debatable belt of high pressures, shifting seasonally. Within it stormy westerlies and drying trades alternately hold sway. It is the sub-tropical belt, a favored climatic region, where invalids seek health, and an escape from the rigors of a cold winter is found by many who have time and means to leave their northern homes.

Rainfall. Rainfall is fairly abundant over the oceans and also over a considerable part of the lands (30-80 inches, and more). It comes chiefly in connection with the usual cyclonic storms, or in thunderstorms, but altitude often serves locally to increase this precipitation. So great are the differences, geographic and periodic, in rainfall produced by differences in temperature, topography, cyclonic conditions, etc., that none but the most general rules can be laid down. The equatorward margin of the temperate zone rains is clearly defined on the west coasts, at the points where the coast deserts are replaced by belts of light or moderate rainfall. Bold west coasts, on the polar side of lat. 40° , are very rainy (100 inches and more a year in the most favorable situations). The hearts of the continents, far from the sea, and especially when well enclosed by mountains, or when blown over by cool ocean winds which warm in crossing the land, have light rainfall (less than 10-20 inches). East coasts, receiving rain from moist winds blowing in from the adjacent oceans as monsoons, or in front of cyclonic storms, are wetter than interiors, but drier than west coasts. Winter is the season of maximum rainfall over oceans, islands, and west coasts, for the westerlies are then most active, cyclonic storms are then most numerous and best developed, and the cold lands chill the inflowing damp air. At this season, however, the low temperatures, high pressures, and tendency to outflowing winds over the continents are unfavorable to rainfall, and the interior land areas as a rule then have their minimum. The warmer months bring the maximum rainfall over the continents. Then conditions are favorable for inflowing damp winds from the adjacent oceans; there is the best opportunity for convection; thunder-showers readily develop on the hot afternoons; the capacity of the air for water vapor is greatest. Continents, from equator to higher latitudes, thus have a tendency to maximum rainfall in the warm season: summer rains as a whole predominate over the lands. The marine type of rainfall,

with a winter maximum, extends in over the western borders of the continents, and is also found in the winter rainfall of the sub-tropical belts. These winter rains are in some respects like the winter rains on windward coasts in the trades. Coastal lands reached by them are well watered, and droughts need not be feared. Rainfalls are heaviest along the tracks of most frequent cyclonic storms.

For continental stations the typical daily march of rainfall is shown in the accompanying data for Berlin and New York.

Daily March of Rainfall (thousandths of the daily mean)

I. *Continental Type.*

<i>Hours.</i>	<i>Berlin.</i>	<i>New York.</i>
Midnight—2 A.M.	.76	79
2-4	.83	85
4-6	.74	79
6-8	.69	80
8-10	.62	74
10-Noon	.68	81
Noon—2 P.M.	.85	83
2-4	.105	95
4-6	.104	91
6-8	.113	90
8-10	.83	85
10-Midnight.....	.78	78

The chief maximum is in the afternoon, and the secondary maximum comes in the night or early morning. The chief minimum comes between 10 A.M. and 2 P.M. Coast stations generally have a night maximum and a minimum between 10 A.M. and 4 P.M., as illustrated in the following data for Valentia:

Daily March of Rainfall at Valentia (thousandths of daily mean)

II. *Marine Type.*

Midnight—2 A.M.	.88
2-4	.93
4-6	.93
6-8	.90
8-10	.84
10-Noon	.76
Noon—2 P.M.	.74
2-4	.75
4-6	.80
6-8	.82
8-10	.82
10-Midnight	.83

Humidity and Cloudiness. Arrhenius gives the mean cloudiness for different latitudes as follows:

70°N.	60°	50°	40°	30°	20°	10°	Eq.	10°	20°	30°	40°	50°	60°S.
59	61	48	49	42	40	50	58	57	48	46	56	66	75

The higher latitudes of the temperate zones thus have a mean cloudiness which equals and even exceeds that of the equatorial belt. The amounts are greater over the oceans and coasts than inland. The belts of minimum cloudiness are at about lat. 30°N. and S. Over the continental interiors the cloudiest season is summer, but the amount is never very large. Otherwise, winter is generally the cloudiest season, with a fairly high mean annual amount.

The absolute humidity as a whole decreases as the temperature falls. The relative humidity averages ninety per cent. more or less, over the oceans, and is high under the clouds and rain of cyclonic storms, but depends, on land, upon the wind direction, winds from an ocean or from a lower latitude being damper, and those from a continent or from a colder latitude being drier.

Seasons: Their Effects on Man. Seasons in the temperate zones are classified according to temperature—not, as in the tropics, by rainfall. The four seasons are important characteristics of these zones, especially of the middle latitudes of the north temperate zone. Here spring and autumn intervene as transition seasons between the colder winter and warmer summer. Towards the equatorial margins of the zones the difference in temperature between summer and winter becomes smaller, and the transition seasons weaken and even disappear. At the polar margins, the change from winter to summer, and *vice versa*, is so sudden that there also the transition seasons disappear.

These seasonal changes are of the greatest importance in the life of man. The monotonous heat of the tropics, and the continued cold of the polar zones are both depressing. Their tendency is to operate against man's highest development. The seasonal changes of the temperate zones stimulate man to activity. They develop him physically and mentally. They encourage higher civilization. A cold, stormy winter necessitates forethought in the preparation of clothing, food, and shelter during the summer. Carefully planned, steady, hard labor is the price of living in these zones. Development must result from such conditions. In the warm, moist tropics, life is too easy. In the cold polar zones it is too hard. Temperate zone man can bring in what he desires of polar and tropical products, and himself raises what he needs in the great variety of climates of the inter-

mediate latitudes. Near the poles the growing season is too short. In the moist tropics it is so long that there is little inducement to labor at any special time. The regularity and the need of outdoor work during a part of the year are important factors in the development of man in the temperate zones.

Weather. An extreme changeableness of the weather, depending on the succession of cyclones and anticyclones, is another characteristic. For most of the year and most of the zone settled weather is unknown. The changes are most rapid in the northern portion of the north temperate zone, especially on the continents where the cyclones travel fastest. The nature of these changes depends on the degree of development, the velocity of progression, the track and other conditions of the disturbance which produces them. The changes may be sudden and marked or faint and slow; the wind may back or veer; the precipitation may be heavy or light; the wind velocity may be light or of hurricane force; anticyclones may be clear or may have clouds, and not infrequently precipitation. There is an almost endless variety of such examples. The detailed study of these varying phases of cyclonic and anticyclonic weather controls belongs to meteorology. It suffices here to say that the particular weather types resulting from this control give the climates their distinctive character, and that the study of climate through these types is the only method of appreciating the actual conditions. Annual and monthly averages of the different climatic elements alone are misleading, and give but a lifeless picture. The cyclonic unit, although its period is irregular and of varying length, is an essential basis of computation and comparison.

The weather types vary with the season and with the geographical position. They result from a combination, more or less irregular, of periodic diurnal elements, under the regular control of the sun, and of non-periodic cyclonic and anticyclonic elements. In summer, on land, when the cyclonic element is weakest and the solar control is the strongest, the dominant types are associated with the regular changes from day to night. Daytime cumulus clouds; diurnal variation in wind velocity; afternoon thunderstorms, with considerable regularity, characterize the warmest months over the continents and present an analogy with tropical conditions. Cyclonic and anticyclonic spells of hotter or cooler, rainy or dry, weather, with varying winds differing in the temperatures and the moisture which they bring, serve to break the regularity of the diurnal types. On the oceans the diurnal characteristics are much less marked.

In winter, the non-periodic, cyclonic control is strongest. Local conditions of heat and cold become subordinate to the general control by the cyclone, which imports weather from a distance. The irregular changes

from clear to cloudy, from warmer to colder, from dry air to snow or rain, extend over large areas, and show little diurnal control. Spring and fall are transition seasons and have transition weather types. In spring, the growing diurnal quality is marked in the increasing importance of local controls, the appearance of convectional phenomena such as spring rains; the struggle between the cyclonic and the solar controls of temperature, now one and now the other being paramount, but the latter gaining and the former losing. Cold spells, with cyclonic winds and clouds, recall winter. Warm spells, with marked diurnal temperature range, presage summer. In autumn the decreasing frequency and importance of diurnal phenomena, such as thundershowers, high afternoon temperatures and the like; the active radiation and cooling during the longer nights, with resulting fogs; and the increasing control by the cyclone, point to winter's coming.

Weather types thus differ with the seasons. They differ also in continental and marine climates. They differ according to topography and cyclonic and anticyclonic tracks. The south temperate zone oceans have a constancy of non-periodic cyclonic weather changes through the year which is only faintly imitated over the oceans of the northern hemisphere. Winter types differ little from summer. The diurnal control is never very strong. Stormy weather prevails throughout the year, although the weather changes are more frequent and stronger in the colder months.

Climatic Subdivisions. From whatever point of view the temperate zones be considered, it is clear that there are fundamental differences between the north and south temperate. The latter is sufficiently individual to be given a place by itself. The marginal sub-tropical belts must also be considered as a separate group by themselves. The north temperate zone as a whole includes large areas of land, stretching over many degrees of latitude, as well as of water. Hence it embraces so remarkable a diversity of climates that no single district can be taken as typical of the whole. Its climate has been called "a crazy quilt of patches." It is a zone of marked seasonal variations and of great extremes, annual, diurnal, cyclonic. The simplest and most rational scheme for a classification of these climates is based on the fundamental differences which depend upon land and water; upon the prevailing winds, and upon altitude. Thus there are the ocean areas and the land areas. The latter are then subdivided into western (windward) and eastern (leeward) coasts, and interiors. Mountain climates remain as a separate group.

South Temperate Zone. If the climate of the north temperate zone is a "crazy quilt of patches," that of the south temperate is a piece of fairly uniform texture and appearance throughout. This is the effect of the large ocean surface. The whole meteorological régime is more uniform

than in the northern zone. Although the solar climate of the southern hemisphere is more severe than that of the northern, the physical climate is very much less extreme. It has been pointed out that this zone may properly be called "temperate;" that its temperature changes are small; its prevailing winds are stronger and steadier than in the northern hemisphere; its seasons more uniform; its weather prevailingly stormier, more changeable, and more under cyclonic control. The uniformity of the climatic conditions over the far southern oceans is monotonously unattractive. The continental areas are small, and develop to a limited degree only the more marked seasonal and diurnal changes which are characteristic of lands in general. The summers are less stormy than the winters, but even the summer temperatures are not high. Such an area as that of New Zealand, with its mild climate and fairly regular rains, is really at the margins of the zone, and has much more favorable conditions than do the islands farther south. These islands, in the heart of this zone, have dull, cheerless and inhospitable climates, with snow sometimes in midsummer. The zone enjoys a good reputation for healthfulness, which fact has been ascribed chiefly to the strong and active air movement, the relatively drier air than in corresponding northern latitudes, and the cool summers. It must be remembered, also, that the lands are mostly in the subtropical belt, which possesses peculiar climatic advantages, as will be seen. The northern oceans repeat, in a much modified form, many of the characteristics of the south temperate oceans. Except to leeward of the broad lands, the northern oceans have the conservative features typical of marine climates the world over.

Sub-tropical Belts: Mediterranean climates. At the tropical margins of the temperate zones, in the latitudes of the tropical high pressure areas, are the so-called sub-tropical belts. Far enough from the equator to be free from continued high temperatures, and near enough to it to be spared the extreme cold of higher latitudes, these transition belts are among the most favored of the world. Their rainfall regime is alternately that of the westerlies and of the trades. They are thus associated, now with the temperate and now with the torrid zones. In winter, the equatorward migration of the great pressure and wind systems brings these latitudes under the control of the westerlies, whose frequent irregular storms give a moderate winter precipitation. These winter rains recall the winter trade rains of the torrid zone, although their origin is different. They are not steady and continuous, but are separated by spells of fine sunny weather. The amounts vary greatly.¹

¹ In round numbers, Lisbon has 28.60 inches; Madrid, 16.50; Algiers, 28.15; Nice, 33.00; Rome, 9.90; Ragusa, 61.90.

In summer, when the trades are extended polewards by the outflowing equatorward winds on the eastern side of the ocean highs, mild, dry, and nearly continuous fair weather prevails, with general northerly winds.

The sub-tropical belts of winter rains and dry summers are not very clearly defined. They do not extend continuously around the world. They are mainly limited to the western coasts of the continents, and to the islands off these coasts in latitudes between about 28° and 40° . Their degree of development, and importance, vary in different longitudes. The subtropical belt is exceptionally wide in the Old World, and reaches far inland there, embracing the countries bordering on the Mediterranean in southern Europe and northern Africa, including the Azores and the famous Riviera, and then extending eastward across the Dalmatian coast and the southern part of the Balkan peninsula into Syria, Mesopotamia, Arabia north of the tropic, Persia and the adjacent lands. In the great eastward extension of the winter rains in this area, the development of secondary lows over the Mediterranean Sea is an important factor. The fact that the Mediterranean countries are so generally included has led to the use of the name "Mediterranean climates." Owing to the great irregularity of topography and outline, the Mediterranean province embraces many varieties of climate, but the dominant characteristics are the mild temperatures, except on the higher elevations, and the sub-tropical rains.

On the west coasts of the two Americas the subtropical belt of winter rains is clearly seen in California and in northern Chile, on the west of the coast mountain ranges. Between the region which has rain throughout the year from the stormy westerlies, and the districts which are permanently arid under the trades, there is an indefinite belt over which rains fall in winter. In southern Africa, which is controlled by the high pressure areas of the South Atlantic and South Indian Oceans, the southwestern coastal belt has winter rains, decreasing to the north, while the east coast and adjoining interior have summer rains, from the southeast trade. Southern Australia is climatically similar to South Africa. In summer the trades give rainfall on the eastern coast, decreasing inland. In winter the westerlies give moderate rains, chiefly on the southwestern coast. Northern Chile, California, southwestern Australia and the Cape province of Africa are thus all in the subtropical belt.

The subtropical climates follow the tropical high pressure belts across the oceans, but they do not retain their distinctive character far inland from the west coasts of the continents (except in the Mediterranean case), nor on the east coasts. On the latter, summer monsoons and the occur-

rence of general summer rains interfere, as in eastern Asia and in Florida.

Strictly winter rains, with a maximum in December or in June, according to the hemisphere, are typical of the coasts and islands of this belt. The more continental areas have a tendency to spring and autumn rains. The rainy and dry seasons are most marked at the equatorward margins of the belt. With increasing latitude, the rain is more evenly distributed through the year, the summer becoming more and more rainy until, in the continental interiors of the higher latitudes, the summer becomes the season of maximum rainfall. The monthly distribution of rainfall in two subtropical regions is shown in the accompanying data and curves.

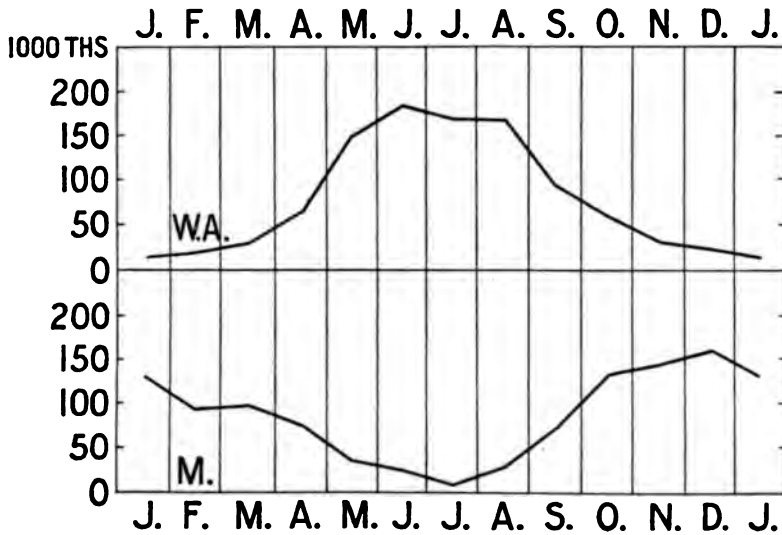


FIG. 1

Monthly Distribution of Rainfall; Subtropical Winter Rains.
(In thousandths of the annual mean)

M.—Malta; W. A.—Western Australia.

Monthly Distribution of Rainfall (in thousandths of the annual mean):*Subtropical Winter Rains.*

	Western Australia	Southern Italy Sicily Malta
Latitude	32.3° S.	About 38° N.
January	14	130
February	18	93
March	30	98
April	64	75
May	150	35
June	183	23
July	168	8
August	166	28
September	93	73
October	59	133
November	32	144
December	23	160

The following table (from Supan), giving the seasonal distribution of rainfall in southern Europe, in percentages of the annual mean, shows very clearly the change in the rainfall season in going from north to south. In the northern Tyrol, the normal type of central Europe prevails. In Sicily, the summer is almost rainless: the subtropical type is fully developed.

Seasonal Distribution of Rainfall in Central and Southern Europe
(in percentages of the annual mean)

	Winter	Spring	Summer	Autumn	Range
Northern Tyrol	16	24	37	23	9
Southern Tyrol	14	26	28	32	8
Po Valley	20	26	24	30	6
Central Italy	25	24	17	34	9
Southern Italy	31	25	11	33	11
Sicily	39	22	3	36	15
Malta	48	14	2	36	22

In Alexandria the dry season lasts nearly eight months; in Palestine from six to seven months; in Greece about four months

The subtropical rains are peculiarly well developed on the eastern coast of the Atlantic Ocean, and are clearly illustrated in the accompanying diagram, after Supan.

The different types of rainfall are as follows:

- I. North of lat. 40°N. Rain throughout the year.
- II. Lats. 40°-27°N. Dry in summer (subtropical rains).

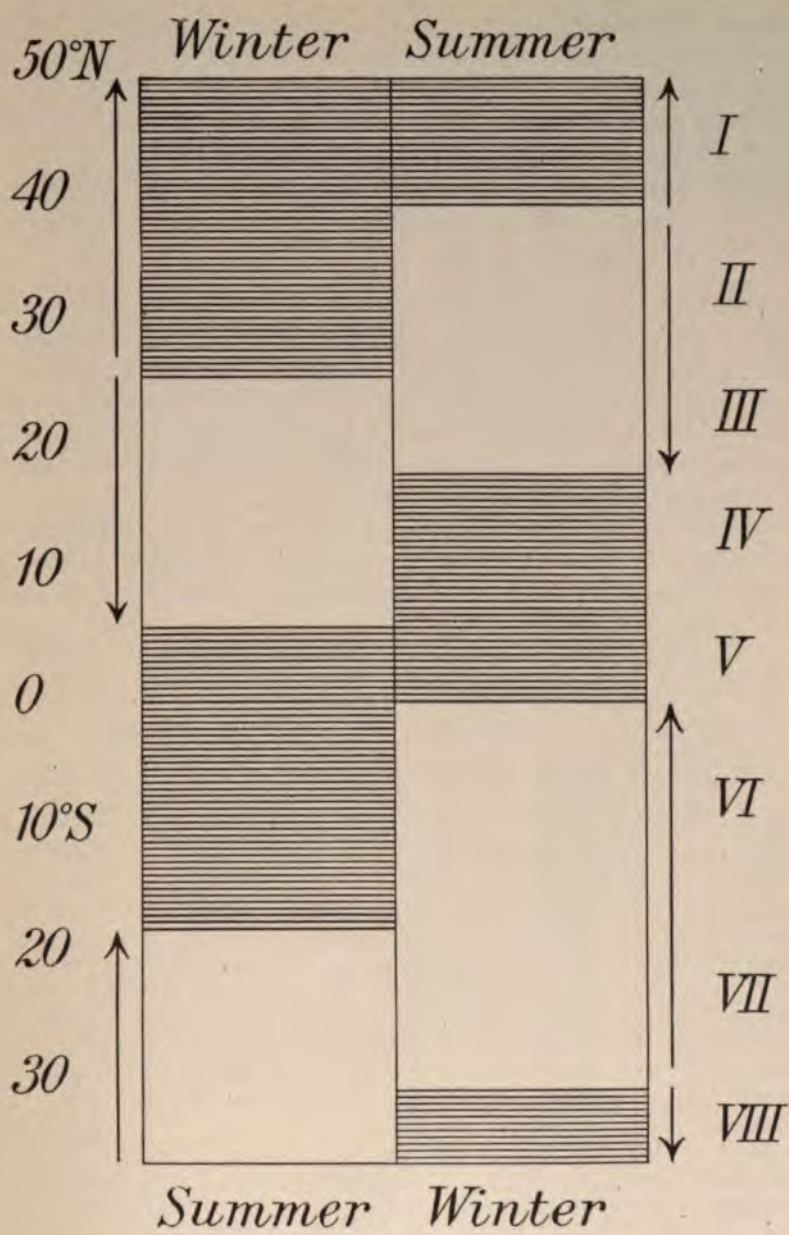


FIG. 2

Rainy and Rainless Zones on the Eastern Atlantic Coast in Winter and Summer.

- III. Lats. 27°N.-19°N. Always deficient in rainfall.
 IV. Lats. 19°N.-7°N. Dry in winter (tropical rains).
 V. Lats. 7°-1°N. Always rainy (equatorial belt).
 VI. Lats. 1°N.-17°S. Dry in winter (tropical rains).
 VII. Lats. 17°-30°S. Always dry.
 VIII. Beyond lat. 30°S. Always dry.
 (IX. Always rainy on the oceans. The African west coast does not extend into this zone).

The winter rains which migrate equatorward are separated by the Sahara from the equatorial rains which migrate poleward. An unusually extended migration of either of these rain belts may bring them close together, leaving but a small part, if any, of the intervening desert actually rainless. The Arabian desert occupies a somewhat similar position. Large variations in the annual rainfall, and droughts, may be expected towards the equatorial margins of the subtropical belts.

The main features of the subtropical rains east of the Atlantic are repeated on the Pacific coasts of the two Americas. In North America, the rainfall decreases from Alaska, Washington and northern Oregon south-

*Table of Mean Monthly Temperatures for Selected Sub-tropical Stations.**

	Continental		Insular	
	Bagdad	Cordoba	Bermuda	Auckland
Lat.	33°19'N	31°25'S	32°20'N	36°50'N
Long.	44°26'E	64°12'W	64°43'W	174°51'E
Altitude	39 ft.	1440 ft.	148 ft.	276 ft.
January	50.9°	73.4°	62.4°	67.1°
February	53.1	72.3	61.9	67.5
March	62.1	68.4	61.7	65.5
April	69.3	61.0	64.4	61.5
May	82.0	54.5	69.6	56.7
June	89.6	49.1	74.8	53.2
July	92.8	50.0	78.8	51.8
August	92.7	54.3	80.1	52.2
September	85.6	58.6	78.1	54.5
October	76.5	63.5	73.4	57.4
November	62.1	68.5	67.6	60.3
December	52.5	71.8	63.7	64.8
Mean	72.5	62.1	69.6	59.4
Range	41.9	24.3	18.4	15.7

* Given to nearest tenth of a degree Fahr.

wards to lower California, and the length of the summer dry season increases. The mean annual rainfall [1871-1901] at Neah Bay, Wash., is 112.40 inches; at San Francisco, Cal., 22.83 inches and at San Diego, Cal., 9.40 inches. At San Diego, six months (May-October) have each less than

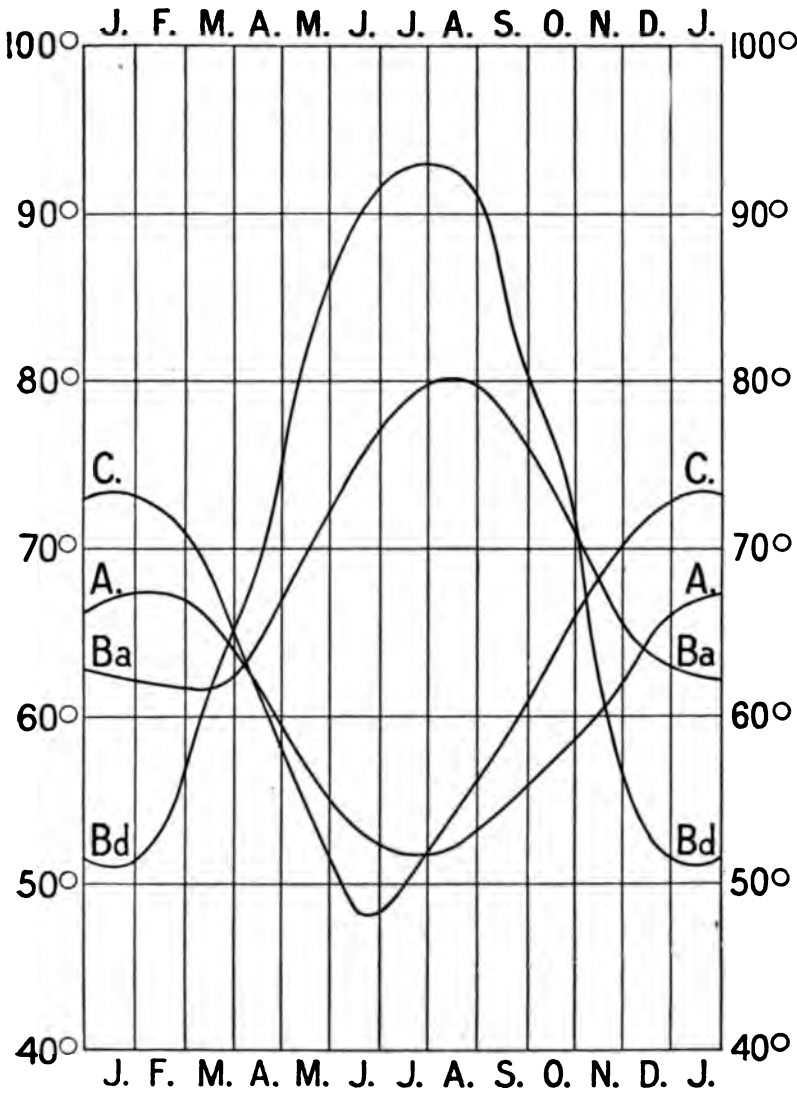


FIG. 3. Curves.

Mean Monthly Temperatures for Selected Sub-tropical Stations.

Bd.—Bagdad; Ba.—Bermuda; A.—Auckland; C.—Cordoba.

five per cent. of the annual precipitation, and four of these have one per cent. The southern extremity of Chile, from about latitude 38° S. southward, has heavy rainfall throughout the year from the westerlies, with a winter maximum. Northern Chile is persistently dry. In between there are winter rains and dry summers. Neither Africa nor Australia extends far enough south to show the different members of this system well. New Zealand is almost wholly in the prevailing westerly belt. Northern India is unique in having summer monsoon rains and also winter rains, from weak cyclonic storms which correspond with the subtropical winter rains.

From the position of the subtropical belts to leeward of the oceans, and at the equatorial margins of the temperate zones, it follows that their temperatures are not extreme. Further, the protection afforded by mountain ranges, as by the Alps in Europe and the Sierra Nevada in the United States, is an important factor in keeping out extremes of winter cold. The annual march, and ranges, of temperature depend upon position with reference to continental or marine influences. This is seen in the accompanying data and curves for Bagdad, Cordoba, Bermuda and Auckland.

Autumn is as a rule a good deal warmer than spring, as in all the eastern Mediterranean basin, the Canaries, and Madeira. This basin is particularly favored in winter, not only in the protection against cold afforded by the mountains but also in the high temperature of the Sea itself. The southern Alpine valleys and the Riviera are well situated, having good protection and a southern exposure. The coldest month usually has a mean temperature well above 32° . Mean minimum temperatures of about, and somewhat below, freezing occur in the northern portion of the district,¹ and in the more continental localities minima a good deal lower have been observed. (At San Diego, Cal., the absolute minimum is 32° ; at San Francisco, 29° .) Mean maximum temperatures of about 95° occur in northern Italy, and of still higher degrees in the southern portions. Somewhat similar conditions obtain in the subtropical district of North America. Under the control of passing cyclonic storm areas, hot or cold winds, which often owe some of their special characteristics to the topography, bring into the subtropical belts, from higher or lower latitudes, unseasonably low or high temperatures. These winds have been given special names (mistral, sirocco, bora, chamsin, leste, leveche, pampero, southerly burster, etc.)

These belts enjoy abundant sunshine, being among the least cloudy districts in the world. The accompanying data and curve, giving an average for ten stations, show the small annual amount of cloud, the winter

¹ Nice, 30.4° ; Rome, 25.7° ; Palermo, 32° ; Athens, 28.8° .

maximum and the marked summer minimum, in a typical subtropical climate.

Monthly Distribution of Cloudiness in a Subtropical Climate.

(Eastern Mediterranean, Lat. 33.8N.)

Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Year
4.9	4.6	3.8	3.7	2.8	1.3	1.1	1.3	1.8	2.5	4.0	4.7	3.0

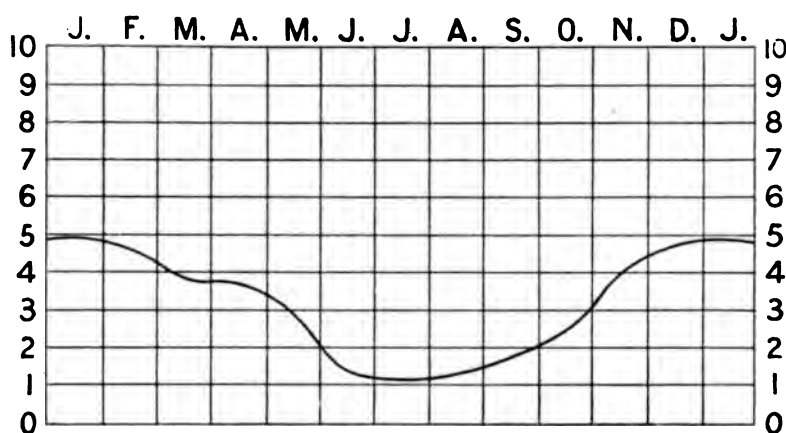


FIG. 4

Monthly Distribution of Cloudiness in a Subtropical Climate.
(Eastern Mediterranean)

The winter rains do not bring continuously overcast skies; and it has been well said that the problem of securing a maximum rainfall with a maximum number of clear days has been solved on the southern Alpine slopes. A summer month with a mean cloudiness of ten per cent. is not exceptional in the drier parts of the subtropics. The winter cloudiness in northern Italy is 5.0 to 6.0; in summer, 3.0 to 4.0. Cairo has an annual mean of 1.9, and June has 0.8. Biskra, on the northern margin of the Sahara, has 264 clear days. In the central valley of California the number of clear days is similarly very large.

With prevailing fair skies, even temperatures, and moderate rainfall, the subtropical belts possess many climatic advantages which fit them for health resorts. The long list of well-known resorts on the Mediterranean coast, and the shorter list for California, bear witness to this fact.

(To be continued)

NEWSPAPER LETTERS FROM THE FORBIDDEN BALKANS.

BY FELIX J. KOCH,
Cincinnati, Ohio.

I.—TO-DAY IN MACEDONIA, AND THE APOSTLES OF BULGARIA

THE situation in Macedonia to-day is, without a doubt, the most complicated, and certainly the most perplexing of any that has existed in these turbulent vilayets since the days of the Thessalonians. Heretofore it has been the story of Turk against Christian that has occupied Europe's attention, but now, added to this, is the internecine war fought among the Christian peoples themselves, and again between these and the Spanish Jews in certain districts. So, in addition to being made up of a polyglot of nations, to-day Macedonia is made up of clan fighters such as no Scotch border ever equaled for ferocity. And in all this strife and turmoil, after spending some six weeks in touring Macedonia, I have come to the conclusion that the Turk is to be pitied, not blamed.

So far as the Turkish side of the errors of omission and commission in Macedonia go, they are too well-known to attract attention. The Reform Commission was at work all of last summer, and in many places has found these not to be so grievous after all. The worst of the number has to do with the farming of taxes, whereby a publican pays the Vali or kaimakan of province or district so much per year for the taxes of that area, and is then permitted to keep whatever else he may force from the peasants. This tax is paid in kind, very largely, and upon assessment. By the new reform program, several villages have the tax paid upon actual yield and contentment reigns supreme.

The terrorists in Macedonia to-day are the "bands." We read almost daily in our papers of attacks upon the "villages," by such and such a band, and then the number of slaughtered and mutilated. Details are not given, because of their commonplaceness to the press correspondent. Recently, in Salonica, a "pope" was assaulted and killed in the streets, for no cause beyond the fact that he was of the Greek Church,—and nothing was thought of the matter. Near Salonica is a little village that is living in a state of perpetual fear of destruction by Bulgar "patriots." The Turkish government stations no patrol here, for, if it did, it would need to do likewise in a thousand other hamlets, suffering like fears.

The story of Macedonia to-day is a study of religious imperialism.

Behind all the stories of Moslem atrocities lies the dream of empire in Macedonia. The Bulgarian looks back to the days of the great Bulgar czardom; the Greek is looking to a pan-Hellenic republic, or, if need be, monarchy, that shall extend north to Monastir and Uscub; the Albanian longs for the restoration of full-fledged Turkish autocracy, without consuls of foreign powers, on every hand, to interfere, and the Rouman is beginning to stir himself for possession of the same area. But the struggle has as yet come only between the Greek and the Bulgar.

Macedonia is a land of four cities—and villages. Cities, the Ottoman Empire over, are much alike; but the villages in this border land are like some outposts of civilization where predatory bands are ever to be feared and where life is as it was at the time of the robber knights or of the *Völker-wanderungen*.

One rides from Monastir out a miserable road filled with ruts, preventing rapid progress, among fields where the Cape buffalo, the great draught animal, wallows, and on to the foothills blue in haze and tantalizing for their very danger. Alone we may not penetrate this area, though it be no farther from a county-seat than New York from Brooklyn. The road winds and then suddenly narrows and we come to a village of two thousand-odd people. We may ride through the town and see no sign of life beyond the dogs and a stray hog at the roadside. Thick rock walls rise up from the street, binding house wall to house wall, and in this narrow little doors give access to the garden only. Not even windows are placed on the lower floor of the home, which stands directly at the road side, in order that, as one goes through, there may be only the thick walls for landscape, and incidentally to protect the tenants. Now and then a lad drives a herd of the long-horned Macedonian goats down this narrow alley way, and the tinkle of their bells assures us we are not in a deserted village. A gate opens, and some woman appears in coat and skirt of black, relieved by white sleeves heavily embroidered, to throw her refuse into the road that the dogs may gather and clear it. Then, again, there is silence.

If we pass into this enclosed garden, we shall pity it for its poverty. A hickory tree and a zenia bed, a few outbuildings and a rubbishheap—and that is all.

One leaves his clogs of wood at the door to pass into the dwelling. The floor is earth, the ceiling puncheon, the walls crudely whitewashed. There are two chairs, a table, and some benches; and here the peasant loiters. Life in the fields cannot consume all one's time—the fields are

altogether too narrow, and so, for safety's sake, the peasants return to their homes, incidentally their fortress, to lounge through the monotonous hours. And in the winter they rarely, if ever, quit these mansions. A low, dark hall, that forms excellent hiding-place for the refugee, leads on to a rear portico, where beans dry in heaps and the matting covers for the buffalo wagons are thrown; and here the women sit and spin on summer afternoons, or pickle their peppers, casting the refuse into a creek that runs within the garden walls below. High above there is another porch, a sort of look-out to detect the coming foe, and here the farmers' stock of peppers and tomatoes and mangoes dry, a blaze of crimson in the sun. Against the walls of the chambers on this floor a divan or two is built, or there may be a bundle of rags piled for bedding. Such is the Macedonian home.

Wealthier folk have a little mantel-shelf built above the hearth, or at either side the protruding chimney, where a few trinkets, cheap glasses, and a Bible repose. Now and then a rough-hewn bedstead, with tumbled pillows and red blankets and the family supply of clothing on a rack close by, may be added to the furnishings. Otherwise these simple homes are all alike.

Above the homes the church is built, the little dome marking it Greek, and under the row of locust-trees that shed their leaves so easily in Macedonia, the good pope gathers the children to "educate them," for, as he says, "by education alone can we combat the brutal 'Bulgars.'"

This, to-day, is Macedonia, and for this the most brutal warfare Europe has experienced in centuries is now being waged.

Folk rise at two in the morning here to work in their fields; they return home at five in the evening, from May to September, day after day the same, not excepting even the Sabbath. In the winter, the time is given over to lounging.

There is but one variation to the peaceful life of these folk, and that comes from the bands. Now and then there swoops down that narrow village street a band of possibly fifty to one hundred men. If the village be of the Greek faith, the band will be Bulgar, if it be Bulgarian, the opposite. Without mercy these men strike down every man, woman, and child who does not succeed in retreating behind the garden walls or into the houses. Firebrands are then produced, and between a fusillade of rocks from the villagers,—for no Christian peasant dare make it known that he possesses firearms in the Turkish Empire—the brigands set fire to the village, until finally the white flag is hoisted and a truce agreed upon.

Then it is the same story ever and ever—the “patriots” force every Greek in the village to swear allegiance to the Bulgarian Church. This done, they depart as they came.

The next day a Greek band may swarm through and force the poor peasants to retract, so that with the weight this spiritual guilt brings upon their souls, they do not know where they stand. And the reason for this armed conversion is—political.



Where the Tobacco and Peppers Dry on the Houses.

Bulgaria, the Pan-Greek party, and the other nationalities are looking forward to one of two events—the death of Franz Josef, or the assassination of Abdul Hamid. Either event, it is felt, will bring about an overthrow of the balance of power in Europe, and then Macedonia will be given to whichever of the buffer states has the largest majority of population. And so the bands are out, murdering and robbing, to intimidate and proselyte.

Just how dangerous the situation in Macedonia is to-day may be gleaned from a few examples.

Across the little Bay of Salonica, opposite the great city of Salonica, the third largest metropolis of Turkey in Europe, rises Mt. Olympus, blue and beautiful, with a low chain of foothills in its shadows. It is but a two hours' sail over the bay to the mountain, and the view from the peak, "where the gods do dwell," is said to be deservedly "heavenly." But to ascend Mt. Olympus one needs take an escort of twenty or more soldiers, because of the brigand bands that infest this neighborhood, and make it the rendezvous for planning their descents into Macedonia.

Near Monastir there is a little village in which, recently, a score of Christians were slaughtered. The dragoman of one of the Consulates was my guide in Monastir, and with our fast little Macedonian sorrel we could have made the trip to the place in no time. But the authorities practically forbade the jaunt to this outlying suburb, because of—none knew just what.

Not even the main arteries of travel in Macedonia, the railways, are safe. In fact, to ride on a Macedonian train requires a complicated series of formalities. To enter Turkey, one needs, first of all, a *visé* on the passport from the Turkish Consul in his home country. Then, on reaching the border, this must be countersigned by the nearest Turkish Consul, and he inquires minutely as to one's profession and purposes in visiting the Empire. That done, he inscribes on the passport the point at which you intend disembarking, and if, as was the case with me at Uscub, disturbances should be on, it is only by the greatest possible amount of pressure being brought to bear that the foreigner will be given the right to descend there. This paper, then, must be certified by the consular scribe, and one leaves for the Ottoman Empire. On reaching the boundary passports are collected, registered, and returned. On leaving the train one passes through a grating, much like that of a customs boundary in other lands, and must show his passport in so doing. Arrived at the hotel, the passport is taken by the *hotelier* to the police and one obtains his "teskerèt," giving the right to walk the streets of the city. When the visitor would depart, he must obtain, through some Consul, permission from the police to go on, for before his ticket will be sold him at the depot he must present such permit on his "teskerèt." Natives, and notably Christians, find it most difficult to obtain passes from vilayet to vilayet and for leaving the country the difficulties are well-nigh insurmountable.

The entire railway system of Macedonia is policed. At distances equal almost to alternate telegraph poles stands a soldier, mounted and armed, instructed to shoot down any one tampering with the track. The engineer has powers of life and death in matters of transportation; and, in

addition, every train bears a *chef*, who is a full-fledged government official. Despite this, however, there have been a half-dozen dynamiting outrages on the railway connecting Salonica and Adrianople.

The degree of blame to be attached to the Turk for the situation to-day in Macedonia is difficult to fix. He is not a terrible fellow after all. In all southern Europe, excepting the Montenegrins, there is not a more hospitable, accommodating, friendly, generous, and peaceable body of men



A Native Han, or Inn, with the Coffee Drinkers.

than the Turks of Macedonia. One does not enter a railway compartment, one does not drop into an inn; one does not, in fact, enter a Turkish village, before they besiege you with questions, and try to make things pleasant. Coffee and cigarettes are immediately offered the stranger, and these he *must accept*. They pose for the kodak; they lead us into their homes; they let us look over their bazaars. I would much rather spend a week in a Turkish village alone than to spend one hour without my guard in either the Bulgar or Greek hamlets of Macedonia.

The Turk is usually let alone by the Greek and Bulgar, respectively, in their quarrels with one another. And so, in return, these are permitted to "fight their battles in peace." Abdul Hamid is working along a peculiar line of diplomacy in Macedonia. He believes in letting the Christian sects devour themselves, in order to keep their minds off the Government. He sides in with the weaker in the struggle, at all times (consequently the favor to the Rumanians to-day in Macedonia), and so fears none of his subjects. That this warfare will eventually tear Macedonia away from him, however, he does not seem to realize.

The Turkish massacres to-day come, not in punishment for these things; their origin is elsewhere. To the Turk, the infidel is, legally, as a dog, minus any civic rights. Among the Turks, as among all peoples, there is an occasional villain who will abuse a Christian woman, rob a Christian larder or cheat a Christian in a deal. Then, before a court, the infidel need hope to secure no redress. The infidel has no rights in Turkey. Appeal to the Turkish Government would be foolish. So the injury rankles. When it is repeated, it burns still more; and the peasant, knowing the Government will not avenge him, goes forth to avenge himself. A Turk is murdered, and despatches to the Sultan tell that the blood of the Moslem must be paid for. Orders are given the nearest Turkish garrison to kill the offender and his family, and this means license to murder and plunder, assault, and finally burn the entire village. The next day we read in our papers of another Macedonian atrocity.

As one Consul put it, "the cause of blood and iron in Macedonia is *not* that the Turks are cruel. The Turk is to be pitied. He is not in the habit of doing these things any more than are the citizens of my own country. But when the occasional Turk does a wrong, he is not properly punished. That is the cause of the Turkish atrocities."

In fact, the Consul says that in the case of a recent Bulgar village from which the bands expelled the inhabitants, excepting of course the few Moslems—who are never molested by these highwaymen—that the Turks tilled the ground, worked the crops, and garnered the sheaves for their late neighbors in their absence, and on their return accepted not a piaster in payment, doing the deed from pure altruistic motives. Such is the "Terrible Turk."

There is a note of sadness in the voice of the intelligent Turk, as he speaks of the situation to-day in Macedonia.

"If the Powers would only let us step in and punish these outrages, we would bring Macedonia to a state of peace in a month. Look at the interior of Asia; what do you hear from there? Nothing! And you would hear nothing of Macedonia either but for the agitators from out-

side. As soon as a foreigner is about to be punished, however, the Consul steps in and demands his release . . . and simply because their sovereigns are looking to the eventual annexation of Macedonia. But," and a smile



A "Bulgar" Pope.

creeps over his face, "wait until we get another Sultan!" And for this all Europe is waiting.

Unless the successor of Abdul Hamid "makes good," it is probable that the salvation of Macedonia will be an occupation similar to that of Bosnia, by the Austro-Hungarians, where peace and plenty now reigns. To it certainly no strenuous objection could be made by any parties concerned. But that is a problem of to-morrow rather than to-day in Macedonia.

To the average mind the word "apostle" means one who is sent upon some important and elevating business; to the inhabitant of this country, however, the word has a sinister meaning, founded on legitimate fear. The most terrifying band of men in all Europe, and probably in the civilized world, to-day call themselves apostles—the Apostles of Bulgaria. They number 125, all told, and led by a brigand, entitled Chief Apostle, they make the life of the inhabitants of European Turkey one of constant terror. Their haunts are the vilayet of Salonik, and recently their especial rendezvous has been this little hamlet of Gradobor, only two hours' ride from Salonica, the second largest city of European Turkey. Murder and rapine are their professions; kidnapping of wayfarers for ransom their pastime. On account of their presence in this immediate vicinity one would not dare make the brief trip from Salonica to Gradobor unattended. Though Greek bands of robbers (who are out ostensibly for revenge, but more particularly for plunder), have rendered such a trip precarious, the 125 Apostles make it worse. There are Greek bandits who seek plunder and revenge; and there are others who are out-and-out robbers; but none of them equal the Apostles, who are worse than either.

Nowhere, in Macedonia, is the traveler safe. This is not a figure of speech; it is a plain, hard fact. When one travels here, he must of necessity take his life in his hands. The Government can guarantee him nothing as regards personal safety. At Monastir the authorities have been waging a war against these bands—a war that is more romantic than effectual. Troups of robbers, usually composed of five or six brigands, made it their business to hold up and plunder travelers, or hold them for ransom. When their number is larger, say 15, murder and rapine are added to the program. And through it all the Government goes steadily on its way, making opera bouffe efforts to bring the offenders to bay, and steadily failing to accomplish its purpose.

When one recalls that a Chief of Police in Turkish domain gets but three and a half "napoleons" (less than \$14 a month), and his subordinate less in proportion, it is obvious that a robber chieftain needs but to try a bribe on the Captain of the saptiets to get him to turn down a wrong defile or enter a wrong canyon when he is sent to capture the offenders.

Gradobor was suffering from a recent attack of the Apostles at the time of our visit. One of the foreign Consuls gives the particulars—none of the people themselves would dare do so. The Apostles captured three men whose families had informed against the bloodthirsty 125 last year. To show what informers might expect, the Apostles deliberately shaved the noses and ears off these men and then mutilated their bodies beyond recognition, leaving them as mute but terrifying reminders that non-Bulgarian sentiments must not be voiced.

Only a few days before five women were kidnapped near here by the Apostles. Two of them were killed; the other three carried off into the mountain fastnesses for a worse fate. In America you hear much of the Turks' outrages against women, but the Consul here tells that the Bulgarians are more fiendish. Not only that, but the band has women employed to further its propaganda of death. This Consul had occasion some months ago to investigate the charges of a Bulgarian damsel against a Turk. The inquiry developed the fact that she was a woman of the lowest repute, who had led the Moslem on, merely to involve the Turks, if possible, in a semi-international complication.

Some weeks ago a bomb was thrown in a delicatessen place on a main street of Salonica. The Turks were immediately blamed by every one for the affair, but investigation showed the Bulgarians the authors and the Apostles the perpetrators. No one but they could have so skillfully smuggled in the military apparatus found near the spot. A few days ago a ten-kilogram dynamite shell was discovered on the railroad track near Salonik, and simultaneously an infernal machine came to light at Annatavo. The latter was to have destroyed the bridge over the Wardar. The man in whose charge the machine was found was hanged. He was a Macedonian leader, Christian Mannof by name, and he declined to save his life by telling where he got the dynamite. The terrible 125 Apostles are therefore credited with the plot, and with reason, and the people are all the more afraid of them.

The 125 mete out certain death to any one reporting adversely on them, and the Reform Committee find it no easy matter to obtain statements that may lead to the arrest of the brigands. Grievances are usually sent in written, but even for this the Bulgarians on one occasion entered a hamlet near here and killed a number of Greeks as a lesson and warning to the rest.

"Two delegates to the commission, friends of mine, said one of the Consuls to me, 'went into another village where atrocities on the part of the Bulgarians occurred, and what do you suppose the people there said about the Turks? Simply this: The Turks had tilled their fields, worked their crops and fed their stock all the time the people had been fleeing before the Bulgarians, and when those people had finally returned to take up their work again the Turks had asked not a metallic for their labor. From pure charity and altruism they had helped the residents of that portion of the country! And this is the 'terrible Turk' about whom America is so wrought up—and so much mistaken."

"If the Bulgarians did not cause him to steel his heart your Turk would be one of the best fellows in Europe." Thus spoke a Consul whose coun-

try's interests in the Balkans are diametrically opposed to Turkey's, and I fully agree with him. I would far rather be alone with a Turk in some wayside inn in old "Kovi-bazaar" than in a village of Greeks or Bulgarians on the railway.

People ask constantly if the Sultan is aware of conditions in his country. Every Consul assures that he is. Whatever the people of his court may try to withhold from him the Ambassadors, in direct audience, undoubtedly tell the defender of the faith, and he thereby knows the true state of affairs. But the young Turks say Abdul Hamid doesn't care. He is content with the name and dignity of Sultan, and he does not leave his capital. He gives orders; but if the powers behind the throne feel so inclined those orders are forgotten or let slip.

Ask about the Miss Stone case (for example) in Macedonia, and you will be answered that Saraffof did not receive the largest portion of the ransom, as was reported; that much of the money was well used, but that a large portion of it helped to form the first coffer of the terrible 125. Each chief of the Macedonian General Committee, when in the field, receives six Turkish pounds a month from Sofia, and while much of this war sinew comes from the peasantry, who pay taxes first to the Turks to be let alone and then to the Bulgarians for the same reason, many a dollar is reported turned into the war chest by the raiding apostles of Bulgaria.

To give them their due, these Apostles pay a shadowy vassalage to Saraffof, who is the leader still of the Macedonian movement, and many times Saraffof may be seen in the disguise of a milkman on the streets of Salonik holding converse with a few of his faithful band.

Men who are in close touch with the Apostles of Bulgaria feel that the Macedonians have given the Powers full time to try their reforms and have shown Europe that they must fail. Now Macedonia claims she will herself rise, since Europe will not lend her martial assistance.

If one go to Macedonia to learn the true grievances of the people, the causes that make possible the existence of blackmailing bands such as the 125, and the atrocities of which we are ever reading, one hears only of the taxes.

The tax grievance in this particular district is the tenth, or tax paid in kind on all produced. Great land owners, or Begs, force the peasants to till the Aga's territory first; after that they may work their own land. When the harvest is ready the peasant may not gather his until the agent of the Beg has taken out his 10 per cent. of the crop. If a peasant grumbles at the amount taken, the agent repays him by purposely delaying collections, so that the crop rots almost wholly in the field. The peasant may not remove a sheaf from the ground until the Beg's share has been taken out by his agent. In five casas, or districts, in this vilayet, reforms in tax

collection have been introduced, and the Consuls affirm that they are working well—but from the people themselves you cannot get information. Were they to talk, some of the 125 or of the Turks might hear—and what pleases one, displeases the other!

"Macedonia," said the Consul referred to above, "doesn't want to join Bulgaria any more than Bulgaria wants to join Russia, despite the fact that Macedonia recognizes Bulgaria as her liberator. Since the reforms



Village Girls Gathering Tobacco near Scene of Miss Stone's Capture.

of last year have gone in, the gendarmerie has done a good deal to improve conditions. Schools have been started at Salonica, Uscub, and Monastir. Houses that were destroyed have been restored by the civil commission. If Serb and Wallach, and Greek and Bulgar would only let each other alone and go about their own business, this would be a delightful country. But the 125 and the rest of the bands do not want to free Macedonia. They are not rising against the Turk, but each is looking to bring Macedonia to some other bribing power. Bribing is going on at Constantinople for favors to the Bulgarian cause in Macedonia. The Turks in this vilayet

actually fear the Bulgarians for the influence they may exert against them at the capital."

As to these schools of European Turkey Salonik boasts of one of the most modern schools in the Balkans. The building is a handsome three-story structure, painted in various shades of yellow, and having a broad



Almost at the Scene of Miss Stone's Capture.

garden surrounded by gratings. Just as the writer was about to enter the institution, two Turkish girls of 16 and 18, judging from their height—for one cannot see their faces—attracted attention. Coming presumably from the cemetery, they approached the fence stealthily, where one of the boy students was enjoying his recess. Near by a young Turk was playing. Immediately he took the cue, darted to the railing and the girls uncovered to him their faces. For a short time a whispered conversation took place, and they seemed to enjoy the semi-stolen interview. This gives you an idea of the spirit of the modern harem. The face is covered only because of the law; not out of individual choice. So, too, are matches being formed in the Orient. Ask any young Turk, and he will tell you it was mother or sister who used to recommend for her beauty or graces the bride to son

or brother, who was then wooed by bargains with the father; but now the young man recalls sweethearts of childhood days—for the girls begin to cover at 12 years, much later than formerly—and that in the years between the one of his choice frequently called upon him and uncovered her charming countenance for his admiration and pleasure.

Five hundred pupils are enrolled in this gymnasium, which strikes the traveler as being rather a good showing for a land where compulsory education is unknown; and the school is not yet twenty years old. The faculty numbers twenty, and the pupils are graded in eight classes. While the school is conducted as pension, over one hundred free students are supported by the Government, the expenses amounting to twelve Turkish pounds each per annum. Lads enter the school at any age between eleven and fifteen, taking three years of primary work before "making" the lycée. Matriculation admits to the University of Constantinople. Uniformity is maintained, but all religions are free to enter. Instruction is in Turkish, and a study of French is compulsory, while both Greek and Bulgarian are offered those who care to study these languages. A laboratory of physics, which is well equipped, is a novelty in this far-away town, but gives dignity to the school.

The City of the 125, old Salonik, of which we shall hear more in a subsequent paper, is one of the hottest places in Europe, in both senses of the word. Not only is robbery, murder and plot and counterplot always incubating here, but nature seems to have chosen this particular spot to show just how torrid she can make man's habitation. The wide pavements along the quays reflect the sun rays with dazzling brilliancy, and the stones of the street soak up the heat all day, to give it off again at night multiplied, apparently, a thousand-fold. The breezes that blow from Mt. Olympus, the monster mountain peak of 2,373 meters, across the bay—"and only 80 kilometers from bandit land," as the Consul puts it—are powerless as soon as they strike the harbor. All their fragrance goes then, and, instead of cooling zephyrs, they turn into heat waves.

The city is built in amphitheater fashion at the foot of Mt. Kortalsch, but, huddling as it does within well-defined walls, as if dreading the lawless bands which have preyed upon its people so long, it is an oppressive place to live during the long summer. The tin roofs of the ramparts and minarets burn and scintillate throughout the blazing days, and the hot streets and narrow alleys offer no relief.

One dare not take notes in Salonik. It is a city of spies, and every one who enters its walls is considered guilty until he proves himself innocent. Even in the residence portion, the pretty suburb of Kalamria, on the east side of the harbor, where wide, square houses set in semi-tropical gardens prevail, and only people every one knows all about dwell, the heavy shut-

ters stay shut all day and the little verandas on the upstairs center fronts are deserted. Not on account of the sun entirely, however, for Salonik is the place of places for spies, and, like the poor, they are always with Salonik. Therefore it behooves all who dwell in the city to beware; and they live under cover in consequence.

Wide though the avenues of the city be, modern the gas and water works, excellent the sewage system, and businesslike many of the enterprises therein, the system of espionage has been changed not a whit since the time of Haroun al Raschid. Though the sun beats down strongly enough in October to give the newcomer from the Occident the vertigo or even an occasional sunstroke, it does not drive off the spies set to watch his every movement. They are spies by choice and by instinct, and they work the trade both ways, reporting one thing to the police and another to the Apostles, if they be not Apostles themselves. What a spy's tale-bearing may lead to is ever a terrifying question in the minds of the people of Salonik. The ranks of the dreaded 125 are made up from Bulgarians, almost wholly; but they are not particular concerning nationality when they are out for victims.

Standing sentinel over the bay, just where it makes its greatest bend, one may see the white old torture tower, prison of the town. It looms grimly before you as you gaze at the harbor—which might shelter 4,000 ships, and which is unexcelled in beauty even by Naples—and the heavy bars at the windows of the old place bring one to a realization that here, especially, the poet might have found inspiration for his lines, "Where every prospect pleases and only man is vile."

A little horse car jingles down the quay and the police blow their tin horns at its every turning. One of these police is a giant Moor, and to see him lord it over the passing crowd gives the Occidental an idea of what despotism implies; an idea which he will not soon forget, especially if he comes under His Moorship's displeasure.

Salonik is the second largest city of European Turkey, and its population is given at 105,000. While over half of these are Jews, there are probably 30,000 Turks dwelling there, 3,800 Franks and the majority of what remains about equally divided between the Greeks and Bulgarians. In addition to the Muschir, or Commandant, of Macedonia, a Greek Metropolitan and a Jewish Great Rabbi have their seats here. What between bribes from these, and again from their subjects, the 125 reap a rich harvest, and one that does not fail for want of garnering.

And from Salonik, the City of Spies, and the headquarters of the Terrible 125 Apostles of Bulgaria there shall be more heard when Macedonia comes again into the public's notice. Meanwhile, they plot and plan—and plan and plot.

SOME ESSENTIALS IN GEOGRAPHY

By JAMES F. CHAMBERLAIN
State Normal School, Los Angeles, Cal.

WHEN I visit an industrial institution where machines, articles of food, clothing or other commodities are being produced, I expect those in charge to be able to tell me the purpose of the various processes employed. They should be able to explain why certain materials are selected and how they are adapted to the uses to which they are to be put. Seldom have I failed to have my expectations in this regard realized. To find a manufacturing company selecting materials and employing processes without a definite knowledge of the results to be attained, would seem strange indeed. Both material and time are too valuable to admit of such a thing. Every effort is made to reduce waste to the minimum, and only essentials, from a business point of view, are employed.

In an educational institution where bodies, minds and souls are being fashioned and given characteristics which are to exert an influence upon the life of the world, we should receive equally definite and intelligent answers to our questions concerning expected results, adaptation of material to the needs of the child, and the value of each particular method employed. Satisfactory answers are the exception rather than the rule, however. Here the materials being shaped are not to be compared in value with stone, iron, the most costly fabrics or precious stones. They are priceless, yet waste is apparent to the most casual observer, and there is little agreement as to essentials or the best method of procedure.

The fundamental purpose of education is certainly to develop character, to fit those being educated for the highest service and joy in life. All other purposes must be subservient to this. If this be true, the essentials of education must be those things and conditions which will contribute most to this end. Having agreed upon this, however, we are not necessarily able to agree in naming the essentials.

Geography is an important factor in education; hence its purpose must agree with that of education in general and its essentials must be selected on the same basis. In so far as the results of geography teaching are meager and unsatisfactory, this condition is, in large part, due to waste; to a failure to select that which is vital and inspiring. Geography is the study of the mutual relations between man and his environment. Only as these relations are grasped through actual contact and observation, can they possess meaning when applied to remote areas.

Wherever the pupil may be, he has before him man in the midst of his environment, showing some of its influence upon his daily life. Here is his material, the study of which will give him a partial mastery of the first great essential in geography—a knowledge of home surroundings, conditions and institutions.

The home, not the earth, is the child's world. From it he directly and indirectly derives the necessities of daily life. This world is actual, real. Here his joys, sorrows, duties, all of his interests and experiences are centered. The outer world is to him as mythical as it was to man thousands of years ago.

That the child's knowledge of unseen lands is based upon things actually observed, is a principle commonly accepted yet not commonly put into practice. Our home geography, is, as a rule, still studied within doors and it therefore lacks concreteness, interest, force. We are apt to forget how largely the home typifies the world. We may not agree with Ritter that all of the conditions necessary for a study of the world are found at home, but it is true that most geographic forms and processes are found in every locality.

Home geography or home knowledge should be centered in the responses which human beings make to their environment. The pupil should know something of the industries of the section in which he lives and how physical conditions and human needs influence them. The pupil should see how this world of his is supplied with food, clothing, and places of shelter and the various comforts and luxuries of daily life. The division of labor, and the dependence of individual upon individual is of great importance in this and in later work. Co-operation in the life of the vicinity should be studied. The construction of roads and streets, the development of a water supply, fire and police protection, park and school systems, and other topics of a similar nature, will, when studied from the vantage ground of personal contact, serve to give the pupil a foundation upon which a real understanding of life in remote regions may be developed.

Location, distance and direction should receive attention also. Places should be located with reference to direction, relation to other places, distance and time involved in reaching them. The making of simple sketch maps is an important part of home geography. By means of such maps these points may be repeatedly emphasized. It is not uncommon to find high school graduates who have no conception of one hundred feet! How useless to talk of the distance which separates New York and San Francisco.

So inseparably linked to the life of the world is the life of the home that no extensive study of the second can be pursued without involving the study of the first. Many of the articles in daily use in the home can be traced to distant lands, and here new and interesting conditions as to surface, climate and people present themselves. Thus the pupil is led by the most natural steps to the study of areas beyond the immediate surroundings—of the outer world—the second great essential in geography.

What should the child be taught regarding the United States and other countries? Many books and courses of study suggest that, by their authors at least, a knowledge of the location of the most conspicuous geographic forms, and the most important cities is the vital thing. Surely no teacher can have failed to observe that to our pupils geography lacks reality. It is static. It is too largely a study of names. Any real picturing of mountains, rivers, forests, cities, and of human beings engaged in daily occupations is the exception. Simple questions calling for answers in terms of actual seeing are responded to by looks of astonishment.

Pupils leaving the elementary school should know why the Hudson is more important than the Delaware; why peaches grow in Michigan but not in Northern Illinois; why coal is cheap in Pennsylvania; why Minneapolis is a great flour-milling city; why population is more sparse in Maine than in Rhode Island; why it costs less to ship a car load of material from Chicago to Denver than from San Francisco to Denver; why New Orleans is not situated at the mouth of the Mississippi. This represents the *character* of the geographic knowledge which pupils should possess. A course leading to the acquisition of such knowledge, will of necessity include facts relating to position, distances, area, population, etc. The course which has given the pupil such knowledge as that indicated above has done more than this—it has given him the power to work out for himself countless problems, to interpret conditions, to enjoy the wonderful works of nature and of man.

Similar results should be worked for in teaching the geography of foreign countries. The time and energy of the pupils should not be employed in memorizing capitals, and in locating capes, but in that which will give them pictures of life as it actually exists, and power to see relations between life and its environment.

The home, the United States, Europe, all countries studied, are but divisions of the larger geographic unit, the globe. Each of these divisions has certain place relations to the earth as a whole, and to other areas. The location of all places studied with reference to hemisphere, latitude, zone, continents, oceans, is brought up repeatedly. Upon the movements of the

earth depend the daily and seasonal changes to heat and light. Some knowledge of the earth as a globe is, therefore, one of the first essentials in geography. Some definite but very elementary study along these lines should be undertaken in the third grade, but an extended study of mathematical geography has no place in the grades. Before pupils leave the elementary school they should have a clear conception of the meaning of such familiar terms as hemisphere, latitude, longitude, parallel, meridian, equator and many others, and they should be able to use a globe intelligently.

A knowledge of physical geography is essential to the comprehension of general geography, whether of the home or of the world, but serious work in this subject cannot be done below the High School. Its elements, however, can be acquired by pupils in the grades, and a knowledge of these elements is an essential part of a course in geography.

The chief facts connected with the distribution of heat over the earth's surface, and its relation to plant, animal and human life, should be known. The great atmospheric movements and their relation to the distribution of temperature and moisture, and through these to life zones and human activities is important. A general knowledge of storm movements across the country, and the power to interpret the daily weather maps, should be a part of the pupil's equipment. The effect of ocean waters upon climate, and the relation of tides to the use of harbors should be presented. The changes in the appearance of the earth which are going on before the eyes of the pupil, the forces responsible for these changes, and their relation to human affairs, are topics of vital importance. The formation of soil and its relation to moisture and crops should be studied. No pupil should be allowed to leave the elementary school without some knowledge of how vegetation is related to water supply and erosion, and of the tremendous value of the forests upon our mountain slopes.

Some knowledge of commercial and industrial conditions is an essential feature of geography. Given a blank map of the world, an eighth grade pupil should be able to locate the great wheat, corn, cotton, rice, sugar, coffee, timber, cattle, coal and iron-producing regions, and the great industrial and commercial centers. Lead the pupil to realize the importance of climate, soil, surface, hydrography, harbors as commercial bases. The general facts as to the preparation of the raw material for the markets, the means and the routes of transportation, should be studied.

Without the use of maps the teaching of geography is very ineffective, yet there are thousands of school rooms in which there are no maps whatever, and where they are found they are often sparingly used. Were their

importance fully realized by the teacher and school authorities, this condition would not exist.

The ability to use maps and atlases and the habit of using them is one of the most valuable possessions which a course in geography can give pupils. Nothing but constant drill will bring about this desirable result. Pupils should have continual practice in the use of scale and key and in locating the areas and places studied. The purpose of a map is to symbolize realities and thus help the learner to picture the unseen. How often it fails to perform its proper function every teacher knows. This is partly the result of faulty teaching, and every effort should be made to remedy it. Even a *poor* map contributes much that could not be obtained through words alone. Our pupils should be taught how to read contour maps as well as flat, relief and raised maps.

The habit of using a map or globe to locate places, which cannot be visualized should be well fixed. Much of our knowledge of geography, as well as much of our education in general, comes through intelligent reading, but intelligent reading means seeing, realizing that which is read. The places which cannot be pictured as one reads, should be looked up on a map or globe.

Considerable time should be given to map drawing in each grade. Such drawing should be done rapidly and from memory and then corrected by comparing with a wall map. Drawing by this method means effort; the mental picturing of the area to be sketched. Copying is purely mechanical. Accuracy as to details is not to be worked for but rather bold and reasonably correct outlines. The purpose of the work is to strengthen the pupil's mental picture, give him confidence and facility in rapid sketching, and enable the teacher to see his difficulties and successes, and thus render him the greatest possible aid.

Geography has more illustrative material than have other subjects. Unfortunately, however, comparatively little of this material can be brought into the schoolroom. Pictures are invaluable aids in the teaching of this subject. They present conditions which cannot possibly be presented through words or maps. Imagine one teacher striving by means of words alone to give her pupils a conception of Niagara Falls, a snowy New England landscape, life in New York City, or the quaint dress of a Hollander; and another supplementing words by the use of carefully selected pictures. How barren would be the results in the first case, *every* teacher knows through years of experience; how full of interest and meaning in the second, those who have used pictures systematically can testify. Directed study of good pictures stands next to

actual observation of that which the illustrations represent. Every school should have pictures carefully selected, mounted and classified. It is not enough to hold pictures up before the class or to pass them around. They must be studied in the light of definite questions assigned by the teacher. The illustrations in our modern text-books will yield valuable returns if studied in connection with the printed matter.

One of the prime essentials in geography is that the pupils should actually see as much of what they study as possible. As previously indicated the area which comes under personal observation is usually very limited. It is our duty to make use of this to the fullest extent, however. Pupils may and often do talk about geographic forms for years, and yet not recognize one of these same forms when they see it. Unless the pupil observes streams, falls, valleys, hills, he can have no conception of them, nor of their combination in extensive landscapes. The thought of changes produced in the appearance of the earth through geographic processes, can never be grasped, unless these forces are seen at work. Knowledge of the busy marts of the world, of industries, of commerce, of means of transportation, of social institutions, must always be hazy unless the learner is brought face to face with similar conditions.

It becomes imperative, therefore, to take pupils out of doors occasionally in order to let them know that the things studied have an actual existence, and to give reality to the study of them. Certain advantages are possessed by the teacher in the rural school, and certain others by the teacher in the city. No school is so situated that excursions cannot profitably be made.

If the principle here laid down be sound, then courses of study which do not provide for such work are unsound, and the fact that the geography class cannot go on an excursion without missing a lesson in language or arithmetic, is no excuse whatever. That the advantage resulting from the excursion would be many times as great as the loss, there can be no question. What can the teacher do who has all grades or several? She should be allowed to give the pupils who cannot be taken on the excursion, a half holiday, if necessary. The whole school, including the teacher, will be the better for the trip. Not until excursions become an integral part of every school course in geography will the subject contribute all that it is capable of contributing to the education of the pupil.

It is very frequently said that geography develops the power of observation. It certainly is true that it *may* produce this result, but unless much of the work is observational in character, it is not likely to produce it. We "learn to do by doing." Reading the words found in the book

and answering questions based on this are not likely to quicken the power of observation. Field work and directed study of maps, pictures, and products which can be brought into the schoolroom will do a great deal along this line. Much of the real joy and profit to be derived from a trip into the country, a visit to the city, an extended journey, and from daily life in general, come through the ability to see things.

It is essential that geography be so taught as to strengthen the pupil's reasoning power, to help him to do independent thinking, to be tolerant, to have a lofty conception of life, and some realization of his privileges and obligations. From the first the pupil should be trained to connect cause and consequence so far as he is able, to seek for the *why* as well as for the *where* and the *how*. Geography should present inspiring landscapes, mighty forces at work upon the earth and man making use of all to his profit and advancement. When geography brings the pupil into close sympathetic touch with human life in all parts of the earth, it is a subject full of meaning and interest, and becomes a powerful factor in true education, the development of character.

At the end of the course of study a child should be able to read intelligently any common map, should know how to get large facts from that map, should know how to study a text in such a way as to join things together causally, should know how to use an index, how to consult an encyclopedia or other book of reference, and get the facts desired, discarding those irrelevant, how to use maps other than those in the book, and where to turn in the city or town library for the information he desires, and should have a desire to know more. He should not feel that all that is in geography is in the text or that geography is unchanging. He should know the general location of each continent and each country, in reference to other nearby regions; its location on the globe, its chief surface conditions and how these factors affect the distribution of the population; the chief climatic features in the same way, the chief industries and the reasons for their development, the commercial status of each country and its chief commodities and commercial ports and cities. His mind should not be burdened with details that are constantly changing, such as statistics of population or area in exact figures. Round numbers are all that should be called for.

NOTES.

THE DIVERSE NAMING OF THE WESTERN MOUNTAIN REGION OF AMERICA AS A WHOLE.—The question of the best general title for the western mountains may be considered as trite by those who do not feel the immediate need of its solution in their professional work. The writer by no means believes it to be trite, as he now completely realizes the wide latitude in naming among the recent influential publications dealing with North American geography. It is scarcely to the credit of our geographical societies and alpine clubs that they will publish at length the statement of one traveler that he found mosquitoes in Newfoundland, of another that his hotel accommodation in Manila was bad, and leave undiscussed the suggestive paper of Prof. Russell and his correspondents on the names of the larger geographical features of North America.¹ There would be no advantage to the European geographers if the Alps masqueraded under a dozen different general titles dependent on the personal tastes of individual writers on those mountains.

It is well known that one of the first designations of the entire mountain group lying between the Pacific and the Great Plains was due to Humboldt. His "Cordilleras of the Andes" extended from Cape Horn to the mouth of the Mackenzie river. Humboldt occasionally used the singular form "Cordillera of the Andes" for the same concept. In view of the general restriction of the term "Andes" to the mountains of South America, Whitney, in 1868, proposed that the name "Cordilleras," with variants, "Cordilleran System" and "Cordilleran Region," be retained to designate the North American equivalent of the Andes. This name was adopted in the United States census reports for 1870 and 1880, and by a great number of expert geologists and geographers since 1868. In process of time, however, the singular form, "Cordillera," and variants, became used in the same sense. In one of these forms the Humboldt root word with Whitney's definition has entered many atlases. It appears on numberless pages of high-class Government reports, geographical, geological, and natural history memoirs, and of such works as Baedeker's "Guide-book to the United States," Stanford's "Compendium of Geography," etc.

The time-honored, erroneous, similarly inclusive name "Rocky Mountains," with variants, "Rocky Mountain System," "Rocky Mountain Belt," etc., has, however, held the dominant place in the popular usage. Its inappropriateness for the heavily wooded Canadian mountains is abundantly

¹Bull. Geog. Society of Philadelphia, 1899, vol. 2, p. 55.

evident. For the United States, Clarence King wrote a generation ago—

"The greatest looseness prevails in regard to the nomenclature of all the general divisions of the western mountains. For the very system itself there is as yet only a partial acceptance of that general name Cordilleras, which Humboldt applied to the whole series of chains that border the Pacific front of the two Americas. In current literature, geology being no exception, there is an unfortunate tendency to apply the name Rocky Mountains to the system at large. So loose and meaningless a name is bad enough when restricted to its legitimate region, the eastern bordering chain of the system, but when spread westward over the Great Basin and the Sierra Nevada, it is simply abominable."¹

The following table summarizes the above-mentioned variants along with others more recently introduced, and still other general names now only of historical interest. The names of prominent authorities and the leading dates when they have published the respective titles are also entered in the table. The authority for some of the older names is Whitney's work on the United States, published in Boston, 1889.

Mountains of the Bright Stones	General use, end of eighteenth century.
Shining Mountains	Morse, 'Universal Geography,' 1802.
Stoney or Stony Mountains	Arrowsmith, 1795; President Jefferson.
Columbians (<i>sic</i>) Mountains	Tardieu, 1820.
Chippewayan Mountains	Hinton, 1834.
The Cordilleras of the Andes (in part)	Humboldt, 1808, etc.
The Cordillera of the Andes (in part)	Humboldt, 1808, etc.
The Cordilleras	Whitney, 1868; many authors since.
The Cordillera	G. M. Dawson, 1884, etc.; Gannett, 1898; Rand-McNally, 1905.
The Western Cordillera of North America	J. D. Dana, 1874, 1880.
The Cordilleras of North America	Hayden, 1883; Leconte, 1892, etc.
The Cordilleran Region	Whitney, 1868, etc.; Hayden, 1883; Shaler, 1891.
The Cordilleran System	Whitney, 1868, etc.; King, 1878; Baedeker, 1893.
The Cordillera System	Hayden, 1883.
The Cordillera Belt	G. M. Dawson, 1879, etc.; Rand-McNally, 1902.
The Pacific Cordillera	Russell, 1899, 1904.
The Cordilleran Plateau	Hayden, 1883.
The Cordillera of the Rocky Mountains	J. D. Dana, 1895.

¹ 'U. S. Geol. Exploration, 40th Parallel, Systematic Geology, 1878,' p. 5.

The Rocky Mountain System	Leconte, 1892, etc.; Heilprin, 1899; many others.
The Rocky Mountain Region	Powell, 1875, etc.; G. M. Dawson, 1890; Gannett, 1899.
The Rocky Mountain Belt	Rand-McNally, 1902.
The Rocky Mountains	Lewis and Clarke; popular.
The Pacific Mountains	Russell, 1899, 1904; Powell, 1899.
The Western Highland	Baedeker, 1893; Keith Johnston Atlas, 1896; Davis, 1899.
The Rocky Mountain Highland	Frye, 1895, 1904.
The Western Plateau	English Imperial Atlas, 1892.

In most technical writings, both of Governmental and of private origin, the suggestion of Whitney has been followed with varying fidelity during the last thirty-five years. It is clear that the inherent connotation of "Cordilleras" is different from that of "Cordillera." The one emphasizes the compound nature of the orographic unit; the other, the singular form of the word, emphasizes the organic union of members. Hayden used both forms of the word. In recent years there has been a rather widespread adoption of the term in the singular number. In 1874, J. D. Dana proposed that the great mountain systems of North America be referred to as the "Western Cordillera" and the "Eastern Cordillera," the latter thus synonymous with what is now commonly called the Appalachian system. Russell, in 1899, proposed "Pacific Cordillera" and "Atlantic Cordillera" with respectively the same significance. Usage has, however, declared that there is but one Cordillera in North America. The expression "Pacific Cordillera" is, according to such established usage, redundant. "The Cordillera of North America," "The Cordilleran System," "The Cordilleran Region," or, with the proper context, simply "The Cordillera," seem to be to-day the best variants on the Humboldt root word.

The fine, dignified quality of the word, convenient in adjective form as in noun form, its unequivocal meaning and its really widespread use in atlas and monograph, make "Cordillera" incomparably the best term for technical and even for the more serious popular works. In fact, there seems to be no good reason why the name should not be entered in elementary school atlases. The objection that the word is likely to be mispronounced by teacher or scholar would equally exclude "Himalaya" and "Appalachian" from school-books. In teaching or learning what is meant by "The Cordillera," the teacher or scholar would incidentally learn so much Spanish. If, in the future, this should be deemed an intolerable nuisance, speakers in English could, in their licensed way, throw the accent back to the second syllable and avoid the unscholarly danger. The second

objection that a cordillera is hereby made to include the extensive plateaus of Utah and Arizona or the great intermontane basins of the United States is more serious. It will, however, hardly displace the word from its present technical use as designating a single Earth-feature ruggedly mountainous as a whole, but bearing subordinate local details of form and structure not truly mountainous. If this objection be regarded as invalid by advanced scientific workers, it will have still less weight for popular or educational use.

The ordinary connotation of the term "highland" makes it unsuitable as part of the name indicating the world's vastest mountain group. Like Powell's name "Stony Mountains," suggested for the majestic Front ranges north of the Union Pacific Railroad, "highland" is "belittling." To most readers it would inevitably suggest Scotland's relief. If the word be raised to the dignity proposed in "Western Highland" or "Rocky Mountain Highland," the writer on the natural features of the Cordillera runs the risk of ambiguity in employing the indispensable common noun "highland," while dealing with local problems of geology, geography, or natural history.

For popular use, the best title alternative with "Cordillera" is, in the writer's opinion, "The Pacific Mountain System." It is suggested by Russell's "The Pacific Mountains." The addition of the word "system" seems advisable as stating the unity of the whole group. The proposal of J. D. Dana to restrict the common noun "system" to mean merely the group of ranges formed in a single geosyncline has to face overwhelming objections. The usage of generations is against it; the enormous difficulty of actually applying it in nature is, perhaps, yet more surely fatal to the idea.

The restriction of the titles "Pacific Ranges" (Hayden), "Pacific Mountains" (Powell in his earlier use of that term; he has since applied it to the whole Cordillera), and "Pacific Mountain System" (A. C. Spencer and A. H. Brooks) to the relatively narrow mountain belt lying between the ocean and the so-called "Interior Plateau" of the Cordillera, seems particularly unfortunate. If there is one grand generalization possible about the entire Cordillera, it is that the Cordillera is both genetically and geographically, a Pacific feature of the globe. The Rocky Mountain ranges proper, the Selkirks, and the Bitter Roots bear the marks of interaction of Pacific basin and continental plateau as plainly as do the Sierra Nevada, the Coast ranges, or the St. Elias range. The large view of the Cordillera assuredly claims the word "Pacific" for its own, and cannot allow in logic that "Pacific Mountain System" shall mean anything less

than the entire group of mountains. The artificial nature of the narrower definition would be equally manifest if it were applied to a topographic or genetic unit forming a relatively small part of the Andes along the immediate shore-line of South America. The Andes mountains form the Pacific mountain system of South America as the whole North American Cordillera forms the true Pacific mountain system of North America.

Yet the term "system" is itself so elastic that it is fitly applied to subdivisions of the Cordillera. For example, the "Rocky Mountain System" expresses an unusually convenient grouping of the northern ranges in Alaska, and of the eastern ranges of the Cordillera in Canada and the United States. Popular, as well as scientific, usage has once for all recognized the propriety of there being in name, as well as in fact, system within system in the grouping of mountains.

R. A. DALY.

THE TEACHING OF GEOGRAPHY.—Various causes have been at work to produce the renewed interest in the teaching of geography thus manifested. In the first place, it has been clearly realized that the older methods of teaching the subject, which I am sorry to say in some cases still prevail, crammed the memory of the child with a host of more or less uninteresting facts, and did nothing either to feed or to cultivate the imagination, or to train the reason of the pupil. This is true whether the method relied on be mere book knowledge, or whether the teaching be supplemented by the use of the ordinary maps. The latter method was and is certainly an improvement on the former, but yet mere map understanding is not sufficient for the complete comprehension of geographical facts and their inter-relations with one another. Much less is it so if we endeavor, as we ought, to make our pupils realize that the geographical facts of a district condition, and to some extent are conditioned, by the more important natural and social phenomena whose exact study belongs to other but related sciences. For it is only by keeping this latter point of view ever in mind that our geographical teaching can be made real and living to the child. Again, it is being slowly realized that any kind of geographical teaching which trains the reason of the pupil to the perception of the causal inter-relation between physical fact and physical fact is the best medium by which to introduce the youthful mind to the study of the natural sciences, and hence it has been well said that geography teaching may be made the gateway to the teaching of science for the subject of geography, of all school subjects, if rightly taught, may enable a child to realize that the world in which he lives is not a mere sum of facts, but an inter-related system, a cosmos, in which fact is related to fact, and conditions

and is conditioned by the nature of the whole. In this connection I may for a moment allude to an opinion held strongly by many educationalists of the present day. They contend that the exact sciences, such as physics and chemistry, should be preceded by a course of study having for its object the training of the pupil to perceive the larger and more obvious causal inter-relations existing between the various parts of the Universe; and they further maintain that if we begin to endeavor to lead a young pupil to select out and to endeavor to understand the more minute and less obvious causal inter-relations, before he has undergone a training in the discrimination of the first-named set of relations, then our method is educationally erroneous, and is one not likely to produce the best results in training the pupil in the methods of science and in the formation of the so-called scientific habit of mind. For in the study of physical geography and the allied branches of knowledge, the facts to be observed and the inter-relations to be discerned are easily separated out from the whole of which they form a part, and can be made readily obvious to minds incapable, through immaturity, of understanding the more abstract and intricate system of causes with which sciences such as chemistry and physics deal. However that may be, all are agreed that the study of geography in the widest acceptance of the term is one of the best instruments for extending the horizon of the pupil, for the cultivating of his imagination, and for training him to reason and to realize the Universe as a system. But a knowledge of geography is not merely valuable as a preliminary to the more thorough and the more accurate study of the natural sciences, it is in many cases necessary for the right understanding of historical facts, and for the thorough comprehension of the history of our own and of other countries. A moment's reflection will enable any one to realize that geographical conditions have largely determined historical change in the past, and that the historical conditions existing at the present can be made completely intelligible only through the prior understanding of the geographical relations. Again, and above all, a full knowledge of geographical facts is necessary for the right understanding of the economic and commercial conditions of our own and other countries. For the localization of a people and the distribution of their industries within any one country and throughout the world generally can be made thoroughly intelligible only when our geography teaching has clearly realized this as its ultimate aim, and when the knowledge has been imparted to the pupil according to a sound method. As the final result of our teaching of geography, we should have made our pupils realize not merely that a certain city or town is placed here or there, but why this is so; not merely that it has such and such industries, but why

these industries are located here and not elsewhere; and lastly, they must understand the use and function the particular city plays in the economic and social life of the nation and of the world generally. Only in so far as we have done this can we be said to have taught the subject at all. Further, while the economic and commercial aspect of the subject is so important for a country such as ours, from the narrow utilitarian point of view, that the knowledge and training is necessary for all those who intend in after-life to enter upon a commercial career, yet it is also important from the fact that it is only by a method which endeavors to attain the end of showing the value of geography for the understanding and interpretation of the economic and social life of a people that we can really educate the child and train his reason. Now the aim of this exhibition is to make us all realize that the teaching of geography is necessary for the true interpretation of natural and social phenomena; that without the preliminary training which geography teaching gives, our efforts at imparting natural science will be more or less ineffective; that without a correct knowledge of the facts of geography, our historical interpretation of the past and our understanding of the historical associations of our own times can never be complete; and that the economic and social life of a people is unintelligible except through a knowledge of the physical environment which everywhere and in all times conditions the growth and distribution of a people and the localization of their industries. Lastly, and above all, the aim of the organizers is to endeavor to bring home to us the unity and inter-connection of all knowledge, to make us realize that geography teaching is not concerned with a particular set of facts and a particular system of causes, but that many systems of facts and their inter-relations must be understood if we are to understand the nature of the social whole.

The second, and perhaps the more important, object of the exhibition is to enable us to obtain some insight into a true and sound method of imparting geographical knowledge, and to give us some insight into methods of arousing, maintaining, and sustaining the interest of our pupils in this particular subject, so that as our final aim we may enable them in after-life to comprehend intelligently the social and economic world in which as men and women they will have to take their place and perform their appropriate functions. Now the best method of imparting geographical knowledge is to go direct to Nature and learn from direct observation the causal interaction of physical fact to physical fact, and how the natural and physical features of a country or district determine the social and economic life of the people. This was the method of Rousseau; still more so was it the method of that much greater educationalist, Pestalozzi, in the teaching of

geography. The cardinal principle of the educational method of Pestalozzi was that the symbol should never be given to the child until he had comprehended the thing signified by the symbol, and we are told that once when his own child used a term without a knowledge of the thing signified by it, he wept from sorrow at finding such an example of educational depravity in his own offspring. In his teaching of geography, Pestalozzi carried out thoroughly the maxim of presenting the symbol only after the thing itself was comprehended. In the once famous school, at Burgdorf the children, along with their teacher, explored the country in the neighborhood of the school, collecting clay in baskets from the riverbanks, and on their return modeled out day by day what they had learned of the physical nature of their environment, and of the inter-connection of physical feature to physical feature. Only after this had been thoroughly comprehended from the clay model was a flat map introduced and the relation of model to map explained. In our present-day teaching of geography this method of going direct to Nature should be employed wherever possible, and especially in the earlier stages, and any other method must be judged good or bad according as it approximates or falls short of the direct method.

But under the altered conditions of our time, and especially in our large towns, the method of going direct to Nature can be followed only to a limited extent, and, further, the method has limitations in itself which makes its consistent use inapplicable under existing conditions, for it is obvious that the direct method is always limited by the narrow range of the child's environment. Again, the best method of teaching here, as in so many other subjects, cannot be employed in its entirety even if it were possible, on account of the limited time in which the knowledge must be imparted. Hence the direct method must be supplemented by others, and all these subsidiary methods must have for their aim the endeavor to make geography a real, a concrete, and a living subject of instruction. If the geography teaching of our schools has only for its results the memorizing of lists of names extracted from a book or gleaned from the unintelligent and premature use of a map, then whatever we may be doing we are not educating the child. Nay, more, by such methods we not only kill the child's present interest in the subject, but also fail to foster any future or later interest; and in many cases such teaching tends to make the child grow up dull, stupid, and unimaginative, and with reason dormant about the world in which he lives.

It would ill become me, however, at this time and in this place to inflict upon you a lecture on the method of teaching geography, but before

closing there are one or two principles to which I have alluded already, and which this exhibition is meant to illustrate, that I should like to draw attention to. In the first place, the exhibition furnishes many instances of the practical application of the principle that, wherever possible, whether in the teaching of physical geography, of political or commercial geography, or the interconnection of these facts with the social and economic facts, we must base our teaching upon what is already known to the child and within his comprehension. Then upon this as a basis we must proceed to form a concrete and living idea of the district or region as a whole. But we must also remember that the mere picturing of a district or of a country is not sufficient; the child at a later stage must be trained to employ his reason in the perception of the causal inter-relations at work. Now, one particular section of the exhibition has for its aim to show how by means of models and diagrams such a concrete picture may be formed in the mind of the child, and how we may train his reason in the perception of the causal inter-relations at work. Another principle, of which the exhibition gives concrete illustration, is that the symbol should follow and not precede the thing signified, and that in particular the understanding and comprehension of a map should be based and follow upon the prior understanding of the reality of which the map is merely a diagrammatic illustration.

But if we limited our teaching of geography to the mere understanding of the child's own district and of his own country; if our only aim were to make him realize how many factors have to be taken into account in the thorough interpretation of any one region, then we should not attain the highest result, and we should fail to realize all that we should endeavor to do in our geography teaching. In addition to this, we must further endeavor to lead our pupils to a knowledge and understanding—imperfect it may be—of the world as a whole, and of the relation, position, and place of his own country to the whole. Now this is a second aim of the present exhibition. It endeavors to show how by the use of models of pictures, of lantern-slides, and other concrete means we may widen the intellectual horizon of the child; how we may extend his range of vision and cultivate his imagination; and how we may deepen and broaden his sympathies.

It is not sufficient that we should know how to lead our pupil to understand and interpret his immediate physical environment, nor to make him best realize the place and function of his own country on this terrestrial globe; we must further endeavor to make him comprehend the nature of the Universe as a whole, and how this planet on which he lives is related to the solar system of which it forms a part, and to the other systems which the starry heavens reveal to our gaze.—*Scottish Geographical Magazine*.

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THE OPPORTUNITY OF THE GEOGRAPHER IN PROMOTING SCHOOL GEOGRAPHY*

By RICHARD ELWOOD DODGE

GEOGRAPHERS the world over, however closely they may confine their investigations to some specialized field of the vast subject of geography, are all interested in making their favorite subject of more importance and value to the world at large. The development of research in geography, as in any field of science, depends largely upon the financial and moral support that can be obtained from public or private sources. That support is more readily given to a subject that is generally recognized as contributing to the welfare of mankind. Applied science is in many cases therefore more generously supported than pure science, because applied science contributes immediately to the betterment of some of the arts and sciences, while pure science does not seem so to do. Inasmuch, however, as progress in applied science involves the previous development of the principles of pure science to be applied in a practical way, it behooves workers in the science of geography to see to it that the value of their work, in either the pure or applied form, is made manifest to the public that the greatest progress may be made in all phases of geography.

The contributions of investigators in geography gathered from work in the field, the laboratory or the library, are the pure science results which aid in the constant better organization and better understanding of the science of geography. The largest application of pure geography is in educational geography, considering broadly that educational geography

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includes all geography which contributes to the general culture and special training of children and adults, whether that training is secured formally in some educational institution or informally through the reading of geographic literature. Training for securing the best results through an informal personal study of geography can only be obtained through a previous formal study of geography in schools and colleges. The work in geography in schools and colleges should therefore be so arranged and organized as to give the best training in the principles of geography, in the methods of classifying geographic facts, and in the use of standard reference works in geography.

Geographers can do no more helpful or valuable work than in assisting in the betterment of educational geography in schools and colleges, working with the officers responsible for the curriculum and showing how applied geography may be used in everyday life in school and out. The better training of pupils in schools in this generation will mean the stronger support of both pure and applied geography by the adults of the next generation. Therefore geographers who aid in educational geography are building for the future and are contributing to the ultimate advancement of the science as much, if not more, than they could in any other way.

We cannot expect leaders in education to be experts in all fields of thought, and but few educational experts have more than a general knowledge of geography. Only the expert geographer can view the whole vast field of the subject, see its perspective and judge as to the relative values of the phases that may possibly be made a part of the curriculum arranged for the training of beginning students of geography.

Hence geographers have a fundamental responsibility in reference to educational geography—a responsibility which they only can properly meet and which presents problems of great difficulty.

No geographer in arranging a course of study for school or college classes can afford to think only of the best, most logical and most scientific order to be followed by adults in special work in scientific geography. He must always face the practical problems that confront the professional educator and frame his steps of progress in geography so as ultimately to lead to the best and most permanent results from the geographic standpoint. He must recognize all the time that the work he proposes must be within the abilities of the students of the age for which it is intended. Otherwise the work will fail of its purpose as a contribution to the knowledge and power of the students, and later work will consequently suffer. He must also bear in mind that but a very minor proportion of the students who begin geography in the earlier years of

the school will ever become trained geographers. The larger number will drop out after a few years of work, and hence the course must be so arranged that at no matter what age the pupil leaves school he will have gained something that will help him in after life.

The problem is also difficult because most schools have few teachers qualified to teach geography as it might be taught and hence the course outlined must be one that the layman can follow with success. Also beginning pupils are studying of necessity several topics at the same time. Hence the geography work to be most effective must be so planned as to help the work in history and literature and be closely related to the other work in science. It is not well to organize a school course to teach geography to children, but one to teach children and to prepare them for later life, in which preparation geography should receive strong and adequate attention.

It is for the geographer therefore to suggest the larger topics in geography that should be included in the school and college courses; to show the best order in which these topics or phases of the subject should be taken up to be of the best immediate usefulness and of the most permanent value to the pupils. He should also suggest in general the way in which the topics should be presented and aid teachers and educational leaders in getting a better grasp of the essentials of geography and in becoming able to teach geography more effectively. In those regions where school geography has come down through the generations unchanged and where a spirit of conservatism keeps in the curriculum many topics of little or no use to the pupils in any way, or which are not essential elements of the science, it is for the geographer to show what topics can replace the old to the best advantage.

Leaders in education are very liable to jump at straws, to insert in their school courses in geography new materials, often of only passing interest, of little or no value in the child's training and frequently worthless geographically, because some educational expert, with perhaps no knowledge of geography as a science, has suggested such topics as valuable as they are so very different from the topics that have persisted through the generations.

After a geographer has fulfilled his duty as outlined above, he must allow the educational leader responsible for the curriculum as a whole to take the initiative in deciding the amount of time to be devoted to geography and to arrange the work by years. The class-room teacher, within the confining but not galling limits set by her superior officers, should have free scope to teach her assignment of work as best she can, bearing in

mind that effective results will only be obtained when the work of her year is based on the work of the previous years, and leads up to that of the next higher year. The details of class-room practice in reference to the teaching of any particular topics cannot be worked out by the geographer unless he has had experience as a class teacher, though he can usually offer many suggestions as to ways of teaching to be tried and tested in the class room. The geographer can suggest the best reference books, the most valuable maps; he can show how maps should be used, how the globe can be made most valuable in the class-room and how the results can be tested from the standpoint of good geography.

With these considerations in mind, the question naturally arises as to what the experience of years and the mandates of good geography have determined as a good course in geography as a preparation for life or for higher work in geography as a science.

It is obvious that in the schools for pupils below thirteen or fourteen years of age, the course of study in geography should be a unit, so divided and arranged as to be of the most value in the training of the youthful mind, and which when completed should lead up to the work of the secondary or high school for pupils from fourteen to eighteen years of age, as that work leads up to the college work.

Ideally there should be a close and unbroken sequence of work in geography from the earlier years of school life through the university. In practice, at least in America, there is a more or less close-knit unit in the elementary school. Unfortunately however there is a long hiatus between this work and the work of the secondary school. The secondary school work, furthermore, is mostly physical geography preparatory to college entrance examinations with an occasional course in commercial geography. Regional geography, which is vital as a part of an adolescent's training for life, is practically omitted from the secondary school, and our graduates of eighteen go out into the world or into college with but little more knowledge of the general geography of the world than they had at the close of their elementary school course four or five years before. This is neither training for further good work in geography in a college or for using geography in everyday life. This great weakness in our plans is now being recognized and it is probable that the ideal condition will gradually be approached more nearly as the years go on.

The elementary school work is at present, therefore, the most thoroughly organized phase of geographic education. Experience and thought have shown that good geography, which can be approved by geographers demands a certain order of study in the elementary schools if we would

make our work practical, strong and disciplinary at every step and as a whole.

The first step in a logical course of study for children should naturally be, as has long been recognized in Germany and England, an analysis of the simpler elements of the vast geographical complex that surrounds a child in any locality and which we call, for lack of a better name, home geography. Home geography is, or should be, the fundamental division of a course of study, because pupils must study the local and familiar phases of the subject in order to appreciate the geography of distant and unknown regions, which can only be interpreted as it can be compared with the known. If the method of science involves "proceeding from the known to the unknown on the well-ordered assumption of the uniformity of nature" (Lloyd Morgan), then good science as well as good teaching requires that beginners should first study their home locality. Home Geography is one of the most difficult phases of geography teaching because any locality presents such a vast series of possible geographic topics and relationships that might be studied. It is obvious, however, that attention should mainly be devoted to those phases of the home environment with which the children come into the most personal contact and the study of which will lay the best foundation for an easy and successful approach to the study of the world or some remote area of the world. Geographers can therefore assist teachers materially by indicating what features of the home locality are most valuable geographically by selecting the vital and world-true relationships and showing how these may be studied so as best to lay a good foundation for all later work in the subject. No two localities have the same environment and hence no course of study can fit any two localities, though the general plan of procedure and the general order of topics may be the same in many contrasted localities. Geographers can help the cause in no better way than by aiding teachers in securing a better understanding of their home locality, and showing how to distinguish between the simple and the difficult and how to lead up to generalizations of permanent value.

Good teaching requires that the foundations laid in the early years should never have to be overturned. The ordinary generalizations of the textbooks are expressed in definitions. The geographers should aid in framing generalizations and definitions that not only define but which may be built upon without overturning the foundations as the years go on.

For instance, the well-worn definition of a river as a "body of water rising at a source and flowing into the ocean," is a bad definition because it is only partly true and because it must be cast aside when in later years

the idea of a river as including detritus and water in varying proportions, as rising in thousands of sources instead of many and as not of necessity reaching the ocean or any body of standing water is developed. This is but one instance out of many that might be chosen to illustrate the point that a definition should summarize the phenomena already studied in reference to a particular topic, and yet be expressed in such a way that future study may be an expansion of the earlier study and not the replacement of the false by the true. Definitions should not only be true for the home locality, but contain the essential ideas of the topic from a world-wide standpoint. Geographers can help good geography teaching vastly by showing how true generalizations of permanent value may be built up through a study of the special cases most immediately at hand.

The study of home geography should lead up to an understanding of the world as a whole in order that beginners may see something of their relations to the inhabited portions of the globe and have a background for the later detailed work on some of the continents. This approach to the world whole should be made through an expansion of the home geography, and there should be no abrupt break between two phases of the subject. By a skillful use of the globe, which is assumed as a miniature representation of the world, children can be led to see their relations to other peoples and distant parts of the globe just as easily and satisfactorily as the relations to local market gardens and manufacturing centers. Through the study of the products of commerce which contribute to their food, clothing or shelter, children may be led far afield geographically and yet feel that the work is personal in that they are studying their own geographical relations to the world.

A study of the simpler reasons why one locality or nation is dependent upon other distant regions for products in everyday use will lead naturally to certain generalizations in reference to world climate and regions of habitability. These generalizations, which may be summarized in the heat belts, give a basis for dividing any continent in later work. Generalizations as to shape and the broad climatic divisions of the world, as to the distribution of the continents in direction and distance in days' travel from the home locality are all that it is necessary to make at this time. Such generalizations can be developed through the study of the relation of the world to the home locality, and these are outgrowths of the normal educational method of studying the unknown through the known. It is not necessary at this time to study the relation of the world to the sun and moon or the motions of the earth or to make broad generalizations as to the divisions of the world into great highlands and lowlands. Such mat-

ters are not necessary at this stage, are too impersonal to be of advantage to the beginners, and if studied will be memorized and not worked out logically and meaningfully, as early generalizations should be. Teachers may have some difficulty in deciding on the regions of the world to be selected as contributing to the home geography and as the best centers through the study of which to develop the larger climatic features of the world. Geographers can be of great service therefore in helping to pick out the strategic points in the commercial geography of the world as related to the home locality and in showing how these selected areas may be studied to the best advantage for the purpose in mind.

Untrained teachers will become too formal in their work, will fail to approach the study from the life side, as it ought to be and will follow a text if possible, instead of making the text their servant, as texts always should be.

The larger part of the later work in school geography must of necessity be the study of the continents. It is usual to study certain of the continents, and in some cases all of them, twice. Unfortunately, however, in many, if not the large majority of schools, the treatment of the continents in both cycles is from the same standpoint, so that the second treatment is merely an expansion of the first treatment. This means that the work in the second cycle is often dry and uninteresting to the pupils because they think they know all that is to be treated. Hence the work is ineffective and does not lead to the best educational results. The fact that many pupils leave school by the end of the fifth or sixth year requires that their own country should be treated early in the course. Those who remain through the elementary school should have as serious and complete a treatment of their own country as possible, as a climax to their school work in geography. The intervening years should be devoted to the other countries and continents, dividing the time according to the relative importance of the different regions from a world standpoint.

The work of necessity, therefore, covering the same general field throughout several years, good geography and good teaching demand that the method of approaching continental study shall not be the same throughout the long time devoted to this phase of the subject. The earlier treatment cannot be as severe as the later because the pupils are not capable of as intensive work. This work should also be as closely related to the earlier work in home geography and the study of the world as a whole as possible, so that the simple facts and relations already considered may be applied and developed. The point of departure, therefore, should be the lives and activities of the people as related to their environment. The

work should be mainly a study of life consequences in a given region through the study of which the physical causes may gradually be developed and shown to be of great importance. It is the life side of geography and not the formal physical side in which young children are most interested and to which they will give the best attention. Because an adult expert geographer would naturally begin with the causal side and work out to the application of his principles in the interpretation of involved life consequences in commercial and political geography is no reason why all students of any age should follow the same sequence. Children under twelve or thirteen years of age are not capable of sustained scientific thinking and gain little value from a method of study that works from causes to consequences in geography. On the other hand, the analysis and comparison of life relations in different regions, through which the pupils gain a knowledge of the facts of geography in everyday life, gives a background of experience and knowledge on which better geography teaching can be based in the later years of the course. The constant bringing out of new phases of the same controlling influence leads the pupils to see the importance of the physical side of geography and the necessity of formulating that side if they would learn to approach the subject of geography as the adult mind ought to approach it.

Hence in the earlier years only those large phases of surface and climate should be emphasized which are necessary as a setting for a study of the life relations of the people. The task then is to study the occupations, industries and inter-relations of the people so as constantly to bring out the causal phases of the subject which make the work knowledge and not mere information.

Later comes a time in which naturally the principles of physical geography, which have been so constantly appearing should be organized and systematized. Then a few months should be devoted to the study of the simpler phases of physical geography as such, in which reference is constantly made to the relations of people to their environment. Such a use of the facts already studied provides the best sort of review because it necessitates the use of materials from a different point of view. Physical geography, or better, the principles of geography, should not be studied in an elementary school as an individual phase of geography. They should be given emphasis and brought for a time to the center of the stage because the logical unity of the course as a whole demands it, and because the succeeding study of certain continents or countries from as serious a standpoint as the age and ability of the pupils permit, necessitates this emphasis. If rightly taught, physical geography becomes practically only a summary,

slightly elaborated, of the essence of the earlier work, and a necessary foundation for the later study of certain parts of the world from a causal standpoint.

In the last years of the course causal geography should prevail. The work should be from causes to consequences, as the earlier work was from consequences to causes, thereby making the later work, not merely an elaboration of the earlier, but an outgrowth of the earlier as a climax to a unified course of study in which at every step the method of presentation has been adapted to the children's abilities, needs and interests.

The causal treatment should be from the large and general features of position, topography, soil, mineral wealth, etc., to the consequent distribution of industries, occupations, centers of population, routes of commerce and trade, etc. Such a method of presentation makes the principles of geography as prominent as the facts, prevents the work from merely being a training in memory skill, gives the pupils habits of study, shows them how to study more geography in later life, either personally or under tuition, and incidentally trains them in the elements of scientific thinking as can no other subject in the curriculum.

Pupils gain most from that course of study which makes them to the fullest extent masters of their own powers, and which does not lead them to become incomplete gazetteers of facts, many of which are erroneous and a large number obsolete. Causal geography rightly taught, and for which the foundations have been carefully laid in the lower grades, is therefore stronger both for present and for future needs than mere memoriter work in which things and not the reason for things are the central thought, and is better geography.

Good geography teaching demands a series of progressive phases in a course of study. At each stage the temptation to roam afield and to waste time on the unimportant details is very great, and only the expert teacher, geographically trained, can test her own plans from the standpoint of good geography teaching. Geographers therefore should help in organizing the subject as a whole, should show what points and principles to bring out, should assist the teacher in deciding between the important and the unimportant, should aid her in securing good maps, should guide her in her study of a map that she may aid her pupils in making map study essential, and should contribute in every way possible toward making geography work in schools of such a character that a geographer cannot stigmatize it as poor or valueless from the standpoint of good geography.

In America we are coming to follow an outline of work similar to that sketched above; our geographers have many of them given their time

freely and abundantly to helping teachers and workers in school geography. The leaven has worked down from the top, as it always must in elementary education, and already the work in school geography has been largely revolutionized in little more than a decade. There have been many mistakes, large and small, and some of the suggestions made by expert geographers have proved unsatisfactory because beyond the abilities of the pupils. But the strong position of geography in our better schools, the much more general distribution of good geography teaching, are largely due to the inspiring and suggestive work of the leaders in geography. This work has proved of great value to the science as a science, and is destined to prove of greater value yearly, so that geography among the adults of the next generation will be in better repute than it has been in this.

Geographers everywhere can well afford to aid in such work, for it brings good geography to the masses and not to the few merely, as it does if they confine themselves wholly to research. Geographers everywhere should recognize their opportunity, if not their duty, in this regard, and put their shoulders to the wheel and work with the leaders of education and the teachers. Growth, improvement, strength, cannot come in school geography if the subject is left entirely to the inexpert (geographically) workers in education. There is no more important phase of the subject than elementary school geography and no phase in which more good work remains to be done. Let us hope that geographers will come more and more to recognize its importance and help to explore what is still to many geographers a "terra incognita."

THE CHARACTERISTICS OF THE ZONES II.—THE TEMPERATE ZONES¹

By ROBERT DE C. WARD
Harvard University

North Temperate Zone: West Coasts. Marine climatic types are carried by the prevailing westerlies on to the western coasts of the continents, giving them mild winters and cool summers, abundant rainfall and a high degree of cloudiness and relative humidity. Northwestern Europe is particularly favored because of the remarkably high temperatures of the North Atlantic Ocean, and because of the influence of the winds controlled by the low pressure area off Iceland. In January, northwestern Europe has temperatures from 20° to 40° in excess of the normal for the latitude. The northwestern coast of North America has temperatures more than 10° too warm. January means of 40° to 50° in the British Isles and the northern French coast occur in the same latitudes as those of 0° and 10° in the far interior of Asia. In July, means of 60° to 70° in the former contrast with 70° to 80° in the latter districts. The conditions are somewhat similar in North America. Along the western coasts of North America and of Europe the mean annual ranges are under 25°;—actually no greater than some of those within the tropics. Irregular cyclonic temperature changes are, however, marked in the temperate zone, while absent in the tropics. The data and curves for the Scilly Isles and for Thorshavn, Faröe Islands, illustrate the insular type of temperature on the west coasts. In the Faröes the mean maximum is 65.1° and the mean minimum 16°. It will be noted that the poleward decrease in the mean annual and the mean winter temperatures is very slow between latitudes 50° and 62°N. on the west coast of Europe.

¹Continued from page 353.

The monthly distribution of rainfall, with the marked maximum in the fall and winter which is characteristic of the marine regime, is illustrated in the last column of the table above, for northwestern Europe, and in the corresponding curve.

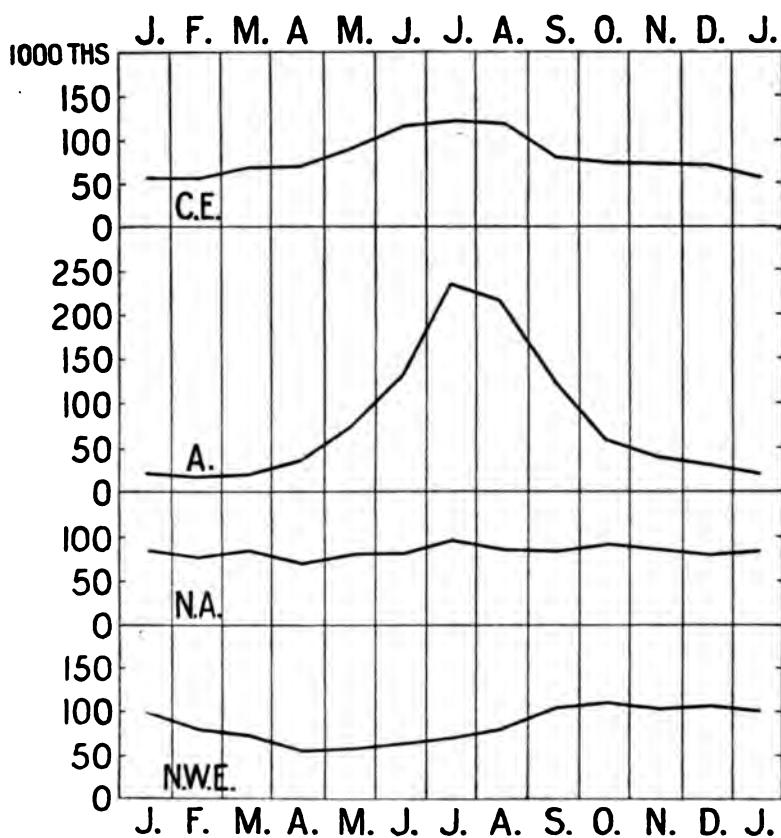


FIG. 6

Monthly Distribution of Rainfall, Temperate Zone.
(In thousandths of the annual mean)

C. E.—Central Europe; A.—Northern Asia; N. A.—Atlantic Coast of North America; N. W. E.—Northwest Europe.

On the northern Pacific coast of North America the distribution is similar. Thus at Olympia, Washington, there is a distinct cold season maximum, as appears in the following data:

Monthly Distribution of Rainfall at Olympia, Washington
(in thousandths of the annual mean.)

January	159
February	135
March	95
April	65
May	44
June	31
July	13
August	13
September	53
October	86
November	124
December	182

In the southern hemisphere, the western coasts of southern South America, Tasmania and New Zealand show the same type.

The cloudiness and relative humidity average high on western coasts, with the maximum in the colder season. The difference in general rainfall conditions between the west coast, typified by the exaggerated case of Valentia, in southwestern Ireland, and the Mediterranean, is seen in the number of rainy days in each district. Valentia has nearly 250. In the latter, they may be set down as about 100, in round numbers.

The west coasts, therefore, including the important climatic province of western Europe, and the coast provinces of northwestern North America, New Zealand and southern Chile, have, as a whole, mild winters, equable temperatures, small ranges, and abundant rainfall, fairly well distributed through the year. The summers are relatively cool, especially on the Chilean coast.

Continental Interiors. The equable climate of the western coasts changes, gradually or suddenly, into the more extreme climates of the interiors. In Europe, where no high mountain ranges intervene, the transition is gradual, and broad stretches of country have the benefits of the tempering influence of the Atlantic. In North America, the change is abrupt, and comes on crossing the lofty western mountain barrier. The data in the table on page 397, and the corresponding curves in Fig. 5, illustrate well the gradually increasing continentality of the climate with increasing distance inland in Eurasia. Central Europe is seen to lie between the modified marine climate of the west coast and the continental conditions of Russia and Siberia. Its mean temperatures do not differ very much from those on the coast, but the seasons are more sharply contrasted.

The continental interiors of the north temperate zone have the greatest extremes in the world. Towards the Arctic circle the winters are extremely severe, and January mean temperatures of -10° and -20° occur over considerable areas. At the cold pole of northern Siberia a January mean of -60° is found. Mean minimum temperatures of -40° occur in the area from eastern Russia, over Siberia and down to about latitude 50°N . At Verkhoyansk, an important town just beyond the Arctic Circle, the absolute minimum is below -90° ; and a mean monthly temperature of -88.8° was noted in January, 1886. Over no small part of Siberia minimum temperatures below -70° may be looked for every winter. Thorshavn and Yakutsk (see table on page 397) are excellent examples of the temperature differences along the same latitude line. The winter in this interior region is dominated by a marked high pressure. The weather is prevailing clear and calm. The ground below a slight depth is frozen the year around over wide areas. The moderate snowfall is sufficient, with the continued cold, to make sleighing possible for immense stretches all over the country. The frozen rivers can be crossed without bridges. This unifying influence, of easy winter communication, has been most important in Russian history, as Leroy-Beaulieu has pointed out. The extremely low temperatures are not disagreeable except when the steppes are swept by icy storm winds (buran, purga), carrying loose snow, and often resulting in loss of life.

In the North American interior the winter cold is somewhat less severe. The lowest January mean temperatures are -30° , in the extreme northern portion of the continent. Mean annual minima of -40° occur down into the northern interior portion of the United States. The lowest is about -58° , near Great Bear Lake, with an absolute minimum of about -72° . North American winter weather in middle latitudes is often interrupted by cyclones, which, under the steep poleward temperature gradient then prevailing, cause frequent, marked and sudden changes in wind direction and temperature over the central and eastern United States. Cold waves and warm waves are common, and blizzards resemble the buran or purga of Russia and Siberia. With cold northerly winds, temperatures below freezing are carried far south towards the tropic. The January mean temperatures in the southern portions of the continental interiors average about 50° or 60° .

In summer, the northern continental interiors are warm, with July means of 60° and thereabouts. These temperatures are not much higher than those on the west coasts, but as the northern interior winters are much colder than those on the coasts, the interior ranges are very large.

The mean annual extreme ranges exceed 150° in northern North America and 170° in Siberia. Mean maximum temperatures of 86° occur beyond the Arctic Circle in northeastern Siberia, and beyond latitude 60° in North America. In spite of the extreme winter cold, agriculture extends remarkably far north in these regions, because of the warm, though short, summers, with favorable rainfall distribution. The July isotherm of 50° is about the northern limit of tree growth. Beyond a zone of stunted tree growth comes the tundra. The summer heat is sufficient to thaw the upper surface of the frozen ground, and vegetation prospers for its short season. At this time, great stretches of flat surface become swamps. The southern interiors have torrid heat in summer, temperatures of over 90° being recorded in the southwestern United States and in southern Asia. In these districts the diurnal ranges of temperature are very large, often exceeding 40° , and the mean maxima exceed 110° .

In South America, the interior of Argentina has moderate mean annual ranges (20° - 30°); the mean maxima reach 95° - 100° and even higher, and the mean minima fall below 23° . The west coast has smaller ranges (less than 20°); lower mean maxima (77° - 86°) and higher mean minima (32° - 23°).

The winter maximum rainfall of the west coasts becomes a summer maximum in the interiors. The change is gradual in Europe, as was the change in temperature, but more sudden in North America. The curves for central Europe and for northern Asia (see Fig. 6) illustrate these continental summer rains. The summer maximum becomes more marked with the increasing continental character of the climate. Thus, while June to August in central Europe give about thirty-five per cent. of the annual precipitation, in northern Asia, excluding the coast, they give nearly sixty per cent. The rains of Asia are actually comparable, in relative intensity, at their maximum, with the rains of the tropics. In Bengal, e. g., June to August give only fifty-seven per cent. of the annual rainfall. The winter dry season of Asia is however very different from a tropical dry season, because of the difference in conditions of vegetation and of snow cover. In North America, Nebraska, a state which is typical of a considerable district of summer rains, receives about sixty per cent. of the annual rainfall in the months of April, May, June and July.

The change in rainfall season with increasing distance from the Atlantic Ocean in Eurasia is well brought out by Supan in the following table.

Table Showing Seasonal Distribution of Rainfall in Eurasia.
(in percentages of the annual mean.)

	Winter	Spring	Summer	Autumn	Range
Ireland	28	21	24	27	5
Western England	28	19	24	29	5
Eastern England	23	19	28	30	5
Northwestern Germany	23	22	31	24	5
Central Germany	20	23	34	23	6
Eastern Germany	19	22	37	22	7
Western Russia	16	21	39	24	10
Central Russia	16	22	37	25	10
Western Siberia	13	13	42	32	14
Eastern Siberia	9	12	58	21	21

There is also a well-marked decrease in the amount of rainfall inland. In western Europe the rainfall averages twenty to thirty inches, with much larger amounts (reaching 80-100 inches and even more) on the bold west coasts, as in the British Isles and Scandinavia, where the moist Atlantic winds are deflected upwards, and also locally on mountain ranges, as on the Alps. There are small rainfalls (below 20 inches) in eastern Scandinavia and on the Iberian peninsula. Eastern Europe has generally less than twenty inches, western Siberia about fifteen inches, and eastern Siberia about ten inches. In the southern part of the great overgrown continent of Asia an extended region of steppes and deserts, too far from the sea to receive sufficient precipitation; shut in, furthermore, by mountains; controlled in summer by drying northerly winds, receives less than ten inches a year, and in places less than five inches. In this interior district of Asia population is inevitably small, and suffers under a condition of hopeless aridity.

The North American interior has more favorable rainfall conditions than Asia, because the former continent is not overgrown. The heavy rainfalls on the western slopes of the Pacific coast mountains correspond, in a general way, with those on the west coast of Europe, although they are heavier (over 100 inches at a maximum). The close proximity of the mountains to the Pacific, however, involves a much more rapid decrease of rainfall inland than is the case in Europe, as may be seen by comparing the isohyetal lines in the two cases. The rain-shadow influence of the Pacific coast Cordilleras extends about half-way across the continent. A considerable interior region is left with deficient rainfall (less than 10 inches) in the southwest. The eastern portion of the continent is freely open to the Atlantic and the Gulf of Mexico, so that moist cyclonic winds have free access, and rainfalls of over 20 inches are found everywhere

east of the 100th meridian. These conditions are much more favorable than those in eastern Asia. The greater part of the interior of North America has the usual warm-season rains. In the interior basin, between the Rocky and Sierra Nevada mountains, the higher plateaus and mountains receive much more rain than the desert lowlands. Forests grow on the higher elevations, while irrigation is necessary for agriculture on the lowlands. The rainfall here comes chiefly from thunderstorms.

In South America the narrow Pacific slope has heavy rainfall (over 80 inches). East of the Andes the plains are dry (mostly less than 10 inches); the southern part of the continent is very narrow, and is open to the east, as well as more open to the west owing to the decreasing height of the mountains. Hence the rainfall increases somewhat to the south, coming in connection with passing cyclones. Tasmania and New Zealand have most rain on their western slopes.

In a typical continental climate the winter, except for radiation fogs, is very clear, and the summer is the cloudiest season, as is well shown in the following data and curve for eastern Asia. In a more moderate continental climate, such as that of central Europe, and much of the United States, the winter is the cloudiest season.

Monthly Distribution of Cloudiness in Continental Climates.

Jan. Feb. Mar. Apr. May June July Aug. Sept. Oct. Nov. Dec. Year.

I. Eastern Asia 10 stations. Lat. 56.5°N . Long. 115°E .

3.1 3.4 3.9 4.7 5.7 5.6 6.2 6.0 5.5 5.4 4.8 4.2 4.9

II. Central Europe. Hungarian Plain. Lat. 47°N .

6.5 5.9 5.7 5.6 5.4 5.3 4.4 4.2 4.6 5.8 6.6 6.9 5.6

In the first case the mean cloudiness is small; in the second there is a good deal of cloud all the year around.

The vast continental interiors, whose climatic features have here been outlined, can obviously be subdivided into smaller climatic provinces almost indefinitely.*

East Coasts. The prevailing winds carry the marine climate of the oceans onto the western coasts of the temperate zone lands. They also carry the continental climates of the interiors off over the eastern coasts of these same lands, and even for some distance on to the adjacent oceans. The east coasts therefore have continental climates, with modifications resulting from the presence of the oceans to leeward, and are necessarily separated from the west coasts, with which they have little in common.

* See, for example, the excellent scheme of climatic provinces suggested by Supan (*Atlas of Meteorology* Pl. 1.)

On the west coasts of the north temperate lands the isotherms are far apart. On the east coasts they are crowded together. The east coasts share with the interiors large annual and cyclonic ranges of temperature. At latitude 55°N. , for example, the east coast of Asia has a mean annual range which is four times as large as that of the west coast. A glance at the isothermal maps of the world will show at once how favored, because of its position to leeward of the warm North Atlantic waters, is western Europe as compared with eastern North America. A similar contrast, less marked, is seen in Eastern Asia and western North America. In eastern Asia there is some protection, by the coast mountains, against the extreme cold of the interior, but in North America there is no such

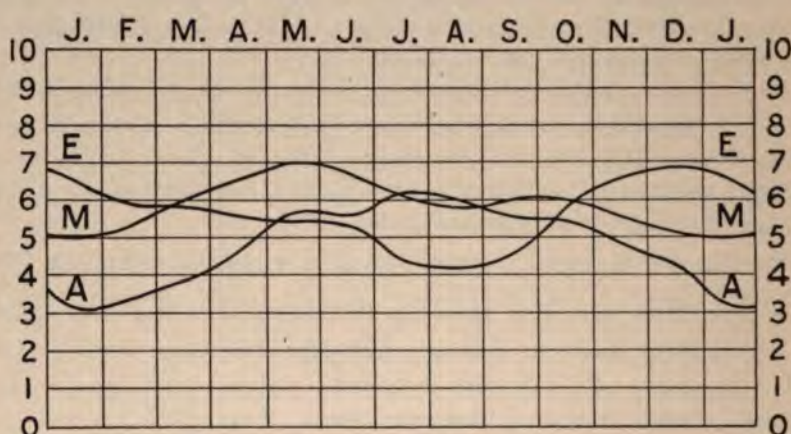


FIG. 7

Monthly Distribution of Cloudiness in Continental and Mountain Climates.

E.—Central Europe; A.—Eastern Asia; M.—Mountain.

barrier, and severe cold winds sweep across the Atlantic coast states, even far to the south. Owing to the prevailing offshore winds, the oceans to leeward have relatively little effect. In the northeast, the cold water is effective in giving cooler summers than farther south.

As already noted, the rainfall increases from the interiors towards the east coasts. In North America, the distribution through the year is very uniform, with some tendency to a summer maximum, as in the interior (see Fig. 6).

In eastern Asia the winters are relatively dry and clear, under the influence of the cold offshore monsoon, and the summers are warm and rainy, with the northward extension of the southeast monsoon, which reaches as

far as lat. 60° N. The summer maximum of rainfall on this coast is clearly shown in the following data (Trabert).

Monthly Distribution of Rainfall. East Coast of Asia.
(in percentages of annual mean.)

Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Year.
2	2	3	6	8	10	12	21	16	11	6	3	19.3 ins.

Rainfalls of forty inches are found on the east coasts of Korea, Kamchatka, and Japan, while in North America, which is more open, they reach farther inland. Japan, although occupying an insular position, has a modified continental, rather than a marine climate. The winter monsoon, after crossing the water, gives abundant rain on the western coast, while the winter is relatively dry on the lee of the mountains, on the east. Japan has smaller temperature ranges than the mainland.

Mountain Climates. The mountain climates of the temperate zone have the usual characteristics which are associated with altitude everywhere. If the altitude is sufficiently great, the decreased temperature gives mountains a polar climate with the difference that the summers are relatively cool, while the winters are mild owing to inversions of temperature in anticyclonic weather. Hence the annual ranges are smaller than over lowlands. At such times of inversion, the mountain tops often appear as local areas of higher temperatures in a general region of colder air over the valleys and lowlands. The increased intensity of insolation aloft is an important factor in giving certain mountain resorts their deserved popularity in winter (e.g. Davos and Meran). Of Meran it has been well said that from December to March the nights are winter, but the days are mild spring. Mountains provoke rainfall, even in arid continental interiors, and thus we have well-forested plateaus and mountain slopes rising above desert lowlands. With increasing altitude agriculture becomes more difficult, and population diminishes, until the upper slopes of lofty mountains are uninhabitable. The diurnal ascending air currents of summer usually give mountains their maximum cloudiness and highest relative humidity in the warmer months, while winter is the drier and clearer season. This is shown in the data below (see Fig. 7).

Monthly Distribution of Cloudiness. Mountain Climate.

(Central Europe. Alpine Summits. 8500 ft. Lat. 47° N. Seven stations.)

Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Year.
5.0	5.3	6.0	6.5	7.0	6.7	6.1	5.8	6.0	6.0	5.5	5.1	5.9

The clouds of winter are low; those of summer are higher. Hence the annual march of cloudiness on mountains is usually the opposite of that on lowlands.

NEWSPAPER LETTERS FROM THE FORBIDDEN BALKANS

By FELIX J. KOCH
Cincinnati, Ohio

II.—TO-DAY IN OLD THESSALONICA.

WITH all the terrors that a brigand-band such as the "125" ever in its vicinity inspires, old Thessalonica, the Salonica of to-day, is still so picturesque that the traveler, the rare visitor, dropping in, cannot choose but linger, for here, if anywhere, is the *old* Orient still unspoiled, and the hooded woman and the Moorish slave go by, in little companies, as they did before infidel foot dared tread where the crescent floated and the Sultan was master of the world.

Salonica, however, has been accursed, from earliest times, and even now it would seem as if "trouble, no end of trouble," were the only news the world receives from the port.

Away back as far as the year 315 B. C., Salonica was the seat of turmoil, Kassander, its actual founder, having driven the inhabitants of a little town to the southward onto the site by force, and then given the newly born village the name of his Queen, the sister of the omnipotent Alexander—Thessalonica. Thessalonica had a splendid situation here on the Thermalisian gulf, and with strong fortifications and stronger alliances it rapidly aspired to power, becoming the metropolis of Macedonia in an incredibly short time, and remaining the capital of that province when Macedonia was swallowed up in the Roman empire.

We have heard much of old Thessalonica—Cicero lived here in exile, and not over half a century before the birth of Christ the Apostle Paul did the preaching which survives in our Bible, while Rome was at the tender mercy of Nero. In fact, St. Paul is reputed to have founded a church at this place, and it was this parish to which he addressed the two famous epistles. Of the strenuous life of these early Christians history has had much to say, for then and there was the beginning of the troublous times for the Salonicans.

Theodoric the Mighty is the next to figure in the story, when the city rebelled against Roman supremacy. The result was that Caesar, in 374, began the Macedonian atrocities, by ordering not less than 7,000 citizens slain in cold blood. So old is the Macedonian question from the humanitarian point of view, and although the bishop of Milan, Ambrose the Good, afterward forced the emperor to perform just 390 penances for

while some authorities tell you that the veiling of women went far back in to the remote period of life in the east, it was Mohammed that made the fashion static for our own day, and also inflicted it upon many tribes that would probably otherwise never have known it. The Moslem, remember, gave the infidel the choice of Koran or death, and when it was the former that he took, it meant that his women must adopt the veil. So it is easy to see the effect on the present. After one has visited Salonica, however, he comprehends the wisdom of the ruling. Even in latter times it has served to protect the Turkish women. During the days of mob rule in 1876, when the French and German consuls were killed by the populace and at the time of the great conflagration, where 2,000-odd homes were destroyed, in order that somebody might have his revenge, as recently in fact as the demonstrations incident to the dynamiting of the Ottoman bank—last April a year ago—it was this difference that alone saved many a woman from injury or insult.

Veils here are different from those anywhere else in the Ottoman domains, nor is this strange when one remembers that everywhere in the East the costume is purely local, and that there is as much difference between cities located as closely as Boston and Salem as there would be between New York and Los Angeles. Down in the Herzegovina veiling still persists to the greatest extreme. There a hood, projecting far beyond the face, is attached to the black coat of the matron, and, not content with this the Turkish women draw a piece of black cloth directly over the countenance. Upon this latter a scarlet or golden design is embossed so that, as the women saunter down the harem lanes, one imagines a butterfly or beetle perching on a field of black inside the "poke bonnet." Yet in the Herzegovina, ever since the Austro-Hungarian occupation, women have been as safe as they are anywhere in the Christian world. But here in wicked Salonik, where no one could swear that, even excepting natural causes, he will be living to-morrow, the Turkish women are now beginning to abbreviate face-covering, and it is probable that before many years, they will go about barefaced unashamed. The Mohammedan gipsies of the Sandahak of Novipazar have already arrived at such condition, and I am told that among the settled Moslem tribes of Asia Minor a like state prevails.

What the result of dropping the veil may be in the world's politics it will be interesting to see. It must affect the social status of all Turkey and with the present status completely overthrown, the Ottoman empire will either rise to new heights or else tumble to the ground—there can be

no halfway measure. It goes without saying that had not Mohammed given such absolute sanction to the wearing of the veil, Moslem women would never have become as distinct, and held so far aloof from the Christians in their country as they have. Consequently, the harem life would have been modified by contact in the centuries, and the traditions imbibed by the Turk while still in his mother's care would have been wholly other. Incidentally, too, had the young Turkish girls mingled more with the non-Moslem women there, such sharp lines would never have been drawn in fashions as now exist, and in every town in the Orient, instead of two sets of raiments in every city, village and town, there would to-day have been but one. What the world must have lost in pattern suggestions and color effects; what the Orient would have failed to turn over to the Occident in artistic suggestions that give pleasure to the color-loving eye, it is impossible to estimate, and for all this we owe thanks to Mohammed.

All in all, the Turkish women of Salonica dress better than do the dames of the proletariat anywhere else in the Balkans. Satin and silk are the general favorites, and the women do not stint. Great flowing sleeves, wide puffed waist, and tastily embroidered skirts, all of black satin edged with crepe, is the regulation attire for the matrons. A widow's veil fits over the rear of the head; while across the face a band of brown, checkered or plain, completes the costume. Most of the women carry black parasols, no matter what weather, and almost all of the wealthier Turkish dames are attended by their stalwart Moorish slaves.

These giant blacks, following the small, hooded women of Salonik, make one realize more than anything else that the East is still the East of the olden time. Much has been asked in the last few years of the status of slavery in Macedonia, and a consul tells me it is this: A slave can go to any foreign consul and make declaration of unwillingness to remain any longer in bondage. This testimony, the consul then presents the vali, or governor, and the slave is declared free. In Ottoman domains, slavery, *per se*, is legally prohibited, but the law is a fiction unless enforced in this wise. In Salonica I was assured that the majority of blacks one sees on the streets are the absolute slaves of their mistresses, and as a Moslem will never mistreat a fellow-Mohammedan, many of these have not the slightest desire for freedom.

Now and then the younger girls accompany mamma and the Moor on the day's shopping, and in their brown and white-checked, flowing gowns, and the veil over the upper half of the face, like a domino mask, they add

a bit of color to the street picture. Father is never along on these shopping excursions and, aside from an occasional peddler, like he who swindled Mrs. Aladdin of her magic lamp, the residence streets are almost barren of men in the business hours of the day. A lad from the tinner's shop, or a donkey train, heavily laden, or some water-seller with polished urn of brass, may draw the inmates of the harems to the lattices.

Strict as are the Turkish women as to the proprieties, in matters of dress, to just such degree is the Salonik Jewess negligent. Probably in all the world where European dress prevails there is not a race of women who wear such decided open-work, whose waists are as low cut save for lace, and whose flounces so loosely cover the figure as do these Jewesses of Salonik. Further, the play of color in their costume is such as to attract attention. Your Salonik Jew grows rich very quickly, be he engaged in commerce or hand-work, in shipping or mere portage, and what he earns, his wife spends on her clothes. Black silk skirts that outrival those of the Turks, open-work waists of the finest Flemish laces, and, above all, a low-cut cape of black satin, fringed with just enough gilt braid to make the glossy black seem immaculate—such is the regulation costume. On the head these women bear a "coffie"—a circular flat cap of red, with triangle of black worn on the front. Suspended from this, and, in relief against the black of the cape and skirt, are two or three broad ribbons of the greenest of green, which the wind lifts now and then and flaunts in the faces of passers, like advance posters of an American circus, half-torn from some city bill board. Attached to these ribbons are the Jewesses, fleshy and tall of stature, and if one has seen a group of them gossiping in their spoiled Spanish, which is here printed in Hebrew letters, you will never forget the sight. Up to the time of marriage, these Jewesses wear ordinary loose European attire, but after that sacrament it is this costume only which prevails. There are just as many synagogues as mosques in Salonica, thirty apiece, while the Christians have but twelve churches.

These Jews are descendants of exiles from Spain who took refuge here in the year of America's discovery. As a result of a religious revival in the 17th century, some of these people became converts to Islam, but as they took on only the externals of the faith, the Mohammedans scorn rather than affiliate with them.

The lighter shade of Salonik life is given by the Greeks. Short white waists, daintily fluted; white waists; a great red belt full of pistols, finely chased; and tall red fez, make the Greek men perfect types of Oriental splendor, especially in contrast to the dirty Spanish Jews of masculine persuasion.

This, however, is picking the *mêlée* to pieces. Bring in the background of sea, Olympus, and the chain of low, bluer hills, and then let these folk commingle, and the scene takes on kaleidoscopic variation. Greek in white, with sash of red and fez; Turk of fair complexion, and swarthy-bearded Jew; men in occidental clothes save for the fez of the nearer East; Jewish women, Turkish women; the street wagon drawn by the Cape buffalo, one must needs be ever snapping the kodak.

Going shopping or marketing in Salonica is like visiting a world's fair Midway. In the fruit stores, where lemons are piled high on the floor, fishermen, like those of the Bagdad tales, in great fur coats and with fish in hand, are stopping. Nearby are the bazaars of baubles and trinkets—cheap blue grass bracelets, candles, soap, and filigree; cloths of gay colors—and all thronged with people in costume. Close beside is a meat bazaar, with the flies nesting on the mutton in the doorway, and one wonders if an exportation of American ice chests would not prove as great a bonanza as our sewing machines have been. Near at hand is the fish arcade, equally filthy, with its baskets of sea trout and eels. Beyond, the cheeses are sold, and vegetables are stacked in the distance.

The clothes bazaar of Salonik is one of the most curious in the world. Shops of the sort, including venders of dress goods, silk, filigrees of better quality, nargilehs and embroideries, line one steeply ascending thoroughfare, about the width of an old Boston cow-path, and over this lane a lattice-work roof has been thrown, so that the avenue seems one great arcade. On the second floor of this tunnel the shop owners usually live, and that no sound of trafficking may disturb their slumbers, these bazaars are closed in the evening.

The Salonik Turk is exceedingly impetuous in his calls to the foreign buyer, and one cannot pass through the arcade, it is safe to say, without at least one more tidy, pipe, scarf, or bit of stoneware. More of these narrow arcades lead off to left and right, that one may become lost in the tantalizing mazes, and what between fruit stores and bakeries, tobacco booths and cafes, this Salonik is a strangely other one from the petrified mass of walls that rises up from the wharves when seen from the harbor. There are modern hotels and warehouses, and foreign post-offices, that one's mail be not confiscated if the Turks suspect treasonable content; but here things are truly Turkish. Get lost among these unlit streets of a dark summer's night, and you will appreciate the fact most thoroughly.

The only absolute and incessantly busy factors in Salonican life are the chestnut venders and the bootblacks. Nowhere in all the world are

there more absolutely pestering bootblacks than in this vilayet capital of Macedonia. Boston shoe polish is consumed almost exclusively over the Balkans, and the best sales are in Salonica. Many of these little bootblacks sell souvenir postals also, and they drive one to extremes with their pestering. One of them would come, time and again, to our table on the quay, verily push the cards in our pocket, saying, in his broken French, he "gives them to us," and then start shining our shoes under protest. Finally, to teach both him and the others a lesson, we pocketed the cards and walked into the lobby. He waited a quarter of an hour for us, but we did not appear with his money. Then, through the shutters, we saw him begin to cry. We reappeared, and explained that, he having given us the cards and shined the shoes without orders, we did not have to pay for them. So he wept, and his comrades looked on in indignant sympathy. They knew too well that against foreigners who might bring into play the consuls of Salonik they could expect absolutely no justice in a Turkish court, so there seemed nothing for them to do. Then our lad, a Spanish Jew, like the most of them, pleaded poverty, and we were touched by his story. We returned him his pictures and a piaster for a present—more than he would clear by his shines in a week—and he went away rejoicing. But after that our shoes were shined only when we so desired. The crowd had learned its lesson.

Another unexpected feature in connection with costume in this heathen land are the venders of rosaries. Many of the Turkish retain fez alone, as symbol of their faith, and in order to be distinguished from these Mohammedans, the Greek Catholics, who likewise wear the fez, carry the sacred beads, but of a different sort from the Moslem rosary. Not even on the streets of ultra Catholic Rome have I seen so many rosaries in actual use as here in this infidel metropolis, and with the background of Moorish gates into high-walled courtyards, and the turbaned tombstones or the fountains, the picture is strikingly incongruous. If, then, a Jew, too, should chance to pass with a copy of the "Life of Roosevelt," that one finds in all Balkan book windows, under his arm, the comminglement of interest would be forcibly complete.

The introduction of the veil has affected architecture also in the East, for the Turkish women must need take the air, and so you enter the house through a courtyard, and this is inclosed by a towering wall, at whose double-doored gate one knocks, that the women within may retreat or cover. Lattices, too, are at the street windows, and from through them one gets inklings of harem squabbles that make us wonder how the two later wives of the Turk agree with the omnipotent first one.

EDITORIAL

THE ATTENTION GIVEN TO SCHOOL GEOGRAPHY

THIS Journal has from time to time voiced its conviction that insufficient attention is given to school geography in many of the school systems of the country. This is indicated in several ways. A large number of the workers in the school field still believe that geography is a cram subject and, as such, deserves no more time than is necessary for memorizing the facts marshalled in a more or less skeletal way in the school geographies. It is also evidenced by the constantly decreasing time allotment in school curricula and by the stuffed courses of study printed for many cities in which the amount of ground to be "covered" in a week or month is simply colossal.

Even more the tendency of the country to believe that geography needs but little attention is indicated by the scant amount of space devoted to the subject in educational periodicals. With the exception of a few extremely progressive papers, geography receives but little attention in the periodicals most used by teachers. An occasional brief note may be included while other subjects like English, History, Art, Nature Study or Manual Training have several pages regularly devoted to them. This is not as it should be, for geography is one of the four time-honored and proven fundamental subjects in the education of any man or woman. As such it deserves an adequate amount of attention by publishers, editors, superintendents and supervisors. If these several classes of leaders would indicate their belief in geography by devoting attention to its educational aspects geography teaching in schools would improve as in no other way. If no incentive is given to the average teacher to pay more than passing attention to geography, the subject will get but little more time or effort than the minimum prescribed by the course of study. This Journal believes that the great problem in geography teaching is elementary school geography. The larger number of pupils in the country study geography in the elementary school or not at all. The material here is most difficult to handle, is less well ordered and more involved. It is in this field that teachers need the most help. The problem is large enough and sufficiently important to be worthy of all the attention it can receive. Let us hope that a new era may soon dawn and that geography teaching may receive the attention from all workers due to so important a subject.

REVIEW

THE GEOGRAPHY AND GEOLOGY OF ALASKA. A summary of existing knowledge, by Alfred H. Brooks. With a section on Climate by Cleveland Abbe, Jr., and a topographical map and description thereof by R. V. Goode. Prof. Paper, No. 45, U. S. Geol. Survey, 1906.

It is impossible to conceal one's admiration for this monograph on Alaska by an explorer whose facility with his pen is no less creditable than his explorations. The work is, undoubtedly, one of the most noteworthy and original contributions to the geography of North America that has appeared in the last quarter century. We have had Alaska pictured by enthusiastic travelers and idealized by artists and novelists, but we are enabled for the first time to obtain from a geographer and geologist an accurate and comprehensive view of the whole province. The physiographic features are regularly described in systematic terms, thus making the book much more valuable as a regional study of the continent than if described in ordinary phrase in the all too common manner of explorers. The book makes a special appeal to the geographer by reason of its balanced descriptions, its constant reference to both controls and responses.

One realizes as never before the value of an efficient application of this guiding principle of the science. The migratory Eskimo of the monotonous expanses of the Yukon Delta; the truculent native middleman of the highly indented southern coast; the solitary winter sledger of the frozen rivers; the distribution and size of spruce and willow and tamarack: these are but a few of the many ontographic items which impel one to the reading of every page.

The report is accompanied by a large topographic map of the territory and by other topographic maps of special areas.

The physiographic sub-divisions are represented on a separate map and afford further data toward completing a detailed physiographic map of the continent. The choice of photographs which illustrate the text is unusually effective.

Space forbids more than the mention of the geologic map and a section on the geology. The limited glaciation of the region and its slight effect on topography is determined as well as the relation of the region to the centers of ice dispersal. As for the structural studies, the stratigraphic position and distribution of some horizons have been fairly well established in the areas surveyed and a table of provisional stratigraphic correlation has been prepared as a working basis for further geologic study and exploration.—*Isaiah Bowman.*

RECENT PUBLICATIONS

FRYE'S FIRST STEPS IN GEOGRAPHY, Alexis Everett Frye, pp. VIII & 171. Boston, Ginn & Co., 1906. A new beginner's book in the well-known series by Mr. Frye, in part revised but largely rewritten. The style is descriptive rather than exclamatory and the book is much more teachable and readable than its predecessor. The well-known features of the author's earlier book have not been lost in the revision and the excellent illustrations have been in large part retained.

KING'S ADVANCED GEOGRAPHY. Charles F. King, pp. XXIV & 287. New York, Charles Scribner's Sons.

An adequate companion to the author's striking *Elementary Geography*. Interestingly written, well illustrated and the best example of the so-called "type" method of teaching geography.

TWENTY-EIGHT EXERCISES ON TOPOGRAPHIC MAPS. M. S. W. Jefferson, pp. 30. The Author, Ypsilanti, Mich.

A laboratory pamphlet by an indefatigable worker and experienced teacher, that deserves use or reference by all teachers of laboratory physiography and geography.

NEWS ITEMS

LECTURES FOR TEACHERS.—Under the auspices of the Brooklyn Teachers' Association a special extension course in the pedagogical side of geography is being given in Adelphi College. Between forty and fifty teachers are enrolled. The course, consisting of thirty lectures is being given by Mr. Ray H. Whitbeck, of Trenton, one of the associate editors of this Journal. A course of field lessons was also given to a class of 8th grade teachers of the City of Newark during the fall by Mr. Whitbeck.

A NEW GEOGRAPHY CLUB.—A club for the special study of geography and the discussion of geographical problems has been formed among the teachers of Buffalo. Miss Ida L. Kempke is president of the club.

NOTES

SCHOOL GEOGRAPHY TO-DAY—The realization of the importance of a knowledge of the mutual relations between man and his environment has led to marked improvements in text-books, in the preparation of the teacher and in methods of instruction. To-day geography is one of the fundamentals in elementary and secondary schools and it occupies a prominent place in several of our universities.

The memorizing of definitions, the location of places and the recital of a few facts concerning each, is no longer considered the essence of geography. The study of human conditions as they actually exist, and of their intimate relations to physical conditions and forces, has, in large measure, taken the place of this dull grind.

In geography most of the field of study is unseen by the pupils. The ability to interpret the geography of remote areas grows out of a knowledge of the home. From the elementary school to the university, therefore, the excursion is now recognized as an essential phase of geography. While the difficulties connected with this line of work are real, the opportunities are greater than many teachers realize, and the results are well worth the effort required. A large number of geographic forms and geographic processes are represented within the immediate vicinity of all schools not situated in great cities. What the city school lacks on the physical side is made up on the industrial and social sides, however.

Because of the remoteness of most of the areas studied, maps become exceedingly important. Pupils should be able to read maps of all kinds readily, and to sketch and mold with reasonable accuracy the countries studied. Unless map study be intelligently pursued much of geography is a mere collection of meaningless words.

Geography touches human life at an infinite number of points. Because of this there is a tendency on the part of the pupil to wander from the question in hand. He has some bit of information, some personal experience perhaps, which he is very anxious to contribute, but which may have no relation to the topic being discussed. A genuine desire to contribute should not be discouraged, yet the pupil must be held to the point. In order that the best course may be pursued the teacher needs wide experience and much tact.—J. F. Chamberlain in *Outlines of Course in Geography*.

THE FERTILE PAMPAS OF ARGENTINE.—The most easterly point of Brazil reaches a longitude much closer to the line passing through Liverpool than the line passing through New York City; for South America and Africa are separated by a shorter span of water than that separating New

Orleans from the northern coast of South America. Buenos Aires, capital of the Argentine Republic, on the same parallel of latitude as Cape Town, is 650 miles nearer to that city than to the city of New York. So great is this easterly range of the Western Continent that more than three-quarters of the western coast of South America lies to the east of New York City.

The area of North America in round figures is 8,300,000 square miles, that of South America being seven per cent. less, or 7,700,000 square miles. In mean altitude above sea-level both continents show practically the same record. Further, they are alike in being of triangular shape, with the apex in each case lying toward the South Pole. Although North America has an advantage in area, the point most distant from the coast in North America is practically the same distance from the coast line as in the most interior point in South America. It is also necessary to take cognizance of the contrast existing between the river systems of North and South America. In South America the heaviest rainfall takes place in that section which offers the broadest catch-basin, or drainage area, and this area lies in the heart of the continent, remote from the sea. In North America the division of greatest rainfall is of contracted area and lies close to the sea. This physical contrast lifts South American waterways into the position of great arteries of trade—commercial highways to the sea from centers of trade and population a thousand miles inland and often inaccessible to railroads.

The Argentine Republic has an area of 1,129,400 square miles, or about one-third the area of Brazil; it is four times the size of its western neighbor, Chile; twice the size of Bolivia, on the north; nine and a half times that of Paraguay, and fifteen and a half times that of Uruguay, both lying to the east. If transferred to the Northern Continent, this Argentine area would cover the Pacific coast territory from the Canadian line to the southern extremity of Mexico, including the States of Washington, Oregon, and California and all the States of Mexico. It could be divided into twenty-five States, each as large as Pennsylvania. From north to south it measures about 2,200 miles, or a distance exceeding that separating New York and Denver. In the northern part, or that nearest the Equator, the country has a width of 1,000 miles, equivalent to the distance between New York and St. Louis; at the extreme southern limit of continental Argentine, however, the eastern and western boundaries are only 200 miles apart. Its coast line is equal in length to a line drawn from Key West, Florida, to Halifax, Nova Scotia. The wide range of climatic conditions prevailing in the Republic is indicated by the circumstance that its territory stretches over as many degrees of latitude as separate, on the Northern

Continent, the most southerly point of Florida and the center of Hudson's Bay.

THE NATURAL DIVISIONS OF THE REPUBLIC

Although the larger portion of the Argentine Republic is popularly described as "the plains," the country falls naturally into three great latitudinal divisions, each possessing marked characteristics of conformation and individuality of vegetation. The division of greatest importance and area is that bearing the name of the "Pampas" and occupying the central section of the Republic. From an elevation of about 2,000 feet in the foot-hills of the Andes the pampas sweep eastward to sea-level at the Atlantic. For the greater part they are treeless and covered with a growth of coarse grass which improves rapidly under grazing. The soil in most sections is rich alluvium, often from three to six feet in thickness, formed by decaying vegetation. This soil rests upon sedimentary deposits of earth scoured from the Andes and adjacent highlands. On these great pampas, or prairies, are pastured the majority of the cattle and sheep for which the Argentine Republic is famous, while districts under cultivation now produce more than half of the corn raised in the Republic.

The second division, which occupies the northern third of the Republic, passes under the general title of the river basin of the Parana. Here immense tracts of country, similar to the southern pampas, are devoted to the raising of wheat and the pasturage of cattle, while the fertile banks of the Parana and the Paraguay rivers are the scene of extensive agricultural colonization. Still farther north lie the sugar lands and the sections rich in timber. The soil of the river-basin country is sedimentary deposit of unusual breadth and depth, for the rivers have so frequently shifted their course that the deposit covers an area of 750 miles long and 400 miles wide, ranging from 30 to 100 feet in depth.

The third natural division of the country comprises the Patagonian plains, which form the southern portion of the Republic. These great plains of gravel and sand once formed a bed of an ocean which rolled against the Andes; they require irrigation to become productive. A number of small valleys of extreme fertility exist, however, in this division. Four salt lakes situated in this section are of commercial value.

While the country justifies the general description of a country of great plains, within its limits are to be found the highest mountains in the Southern Hemisphere, conspicuous among them being the giant uplifts of Aconcagua, 22,860 feet, the highest point in America.

LA PLATA—THE SECOND RIVER SYSTEM OF THE WORLD

The second largest river system in the world finds its way to the sea near Buenos Aires, capital of the Argentine Republic, bringing to that port commercial tribute from 10,000 miles of inland waterways—rivers which, ultimately consolidating in La Plata, discharge into the Atlantic a volume of water 84 per cent. greater than that discharged into the Gulf of Mexico by the Mississippi River. This vast river system is almost wholly the gift of neighboring States, the volume of water in the greatest river of the system being as large where it enters Argentine territory, 825 miles inland, as at the river mouth, loss by evaporation equaling gain from intervening streams. The circumstance that these rivers are full-grown when they first cross the boundary line of the Republic—due to the equatorial drainage area having an annual rainfall of 60 inches—renders them of large commercial value. On the Parana, for example, vessels drawing 21 feet can reach the port of Rosario, 230 miles from Buenos Aires; vessels drawing 19 feet, Santa Fé, 350 miles; those drawing 15 feet, Corrientes, 850 miles, while craft drawing 8 feet navigate affluents of the Parana to points in Brazil distant over 2,000 miles from Buenos Aires.

BUENOS AIRES

Buenos Aires, capital of the Argentine Republic, with a population on September 30, 1902, of 861,513 and an area of 72 square miles, is the largest and most important city of South America, the largest city in the Southern Hemisphere, and the second largest city of the Latin race in the world. Measured by foreign trade standards, it ranks second among American cities, its outward and inward tonnage being more than half the size of that credited to New York and four times as great as the tonnage of San Francisco. Liverpool, a representative old-world shipping center, ranks below Buenos Aires in area and population, and its tonnage is only 50 per cent. greater than that of the Argentine capital. As regards situation, Buenos Aires lies as far south of the Equator as Norfolk is north of the Equator. It is distant from New York 5,868 miles; from Liverpool, 6,154 miles; from Hamburg, 6,500 miles; from Cape Town, South Africa, 5,218 miles; from Sydney, New South Wales, 6,300 miles, the last two cities named being on the same parallel of latitude with Buenos Aires. The city spreads over a level plain situated on the right bank of the great La Plata Estuary, 150 miles back from the sea and 125 miles west of the city of Montevideo, Uruguay, which lies on the northern side of the same estuary. It extends $11\frac{1}{4}$ miles from north to south and $15\frac{1}{2}$ miles from east to west, with a circumference exceeding 38 miles. The

low-lying character of the city's situation, which ranges from 15 to 50 feet above sea-level, combined with the shallow and shifting character of the channel of La Plata, has forced the construction of extensive and enormously expensive harbor works; these works now provide facilities for handling shipping in excess of 20,000,000 tons a year.

Buenos Aires is the commercial as well as the political center of the Argentine Republic, being the gateway and primary market for the larger portion of the trade of the Republic. Although the largest Spanish-speaking city in the world—double the size of Madrid—almost every language is spoken within its limits, four-fifths of its citizens being of foreign birth. Italians are more numerous than natives and there are 100,000 Spaniards resident within the city. Eighty per cent. of the immigrants to the Argentine Republic come to Buenos Aires and it is the permanent home of 18 per cent. of the population of the country.

THE ANNUAL HARVEST

Taking agriculture, one of the great industries of the country, as an illustration, we find the total area under crop to be only 17,464,958 acres. This is one-twentieth of the area available for crops. Indeed, it is estimated that in the provinces of Santa Fé, Corrientes, Cordoba, and Buenos Aires alone there exist over 157,000,000 acres of land capable of growing fine crops of wheat without artificial watering. From an area one-quarter the size of this, the United States now raises one-fifth of the world's wheat supply. To rightly measure, then, Argentine probabilities in the matter of agricultural development, we are thrown back upon the development already existing in certain provinces where wealth and energy have concentrated. Following this line of investigation, we discover that the Province of Buenos Aires, with an area of 69,000,000 acres, about two-thirds as large as California, in 1901 had 1,974,404 acres under wheat, producing 27,996,288 bushels; 1,683,287 acres under corn, producing 51,690,298 bushels; 259,390 acres under linseed, producing 3,650,968 bushels; 27,529 acres under oats, producing 577,654 bushels; 7,286 acres under barley, producing 66,782 bushels. This same province carried 52,630,451 sheep, 7,745,896 cattle, 1,675,385 horses, 248,720 pigs, 11,955 goats, 10,273 asses and mules. Within the limits of this one province, including the capital city, Buenos Aires, there were located, when the census of 1895 was taken, 14,000 manufacturing establishments, employing a capital of \$65,000,000, with 97,000 employees and 1,560 separate pieces of machinery, and yet this small section of the Republic, with its large agricultural, pastoral, and manufacturing development, contained a

population of only 2,000,000, or less than one-third the population of Pennsylvania.—*The National Geographic Magazine*.

THE PORT OF ANTWERP.—The distinction of being the second port of Continental Europe, and the third in the world, in point of tonnage, lies between Antwerp and Rotterdam. The figures for Hamburg, Antwerp and Rotterdam, as given in a prominent Rotterdam newspaper, are as follows, for the calendar years 1904 and 1905:

HAMBURG	No. of Ships	Tonnage
1905	15,118	10,382,000
1904	14,843	9,671,000
Increase	275	711,000
ANTWERP	No of Ships	Tonnage
1905	6,034	9,846,707
1904	5,852	9,398,503
Increase	182	448,204
ROTTERDAM	No. of Ships	Tonnage
1905	8,681	8,537,179
1904	7,893	7,915,736
Increase	788	757,443

These figures on their face give Antwerp the larger tonnage, but there is some difference in the method of calculating tonnage at the two ports, and Rotterdam claims that when proper allowance has been made for this difference, the two ports change their relative positions. Be this as it may, the fact remains, that these three ports together have a very substantial share of both the outward and inward trade of Continental Europe, and are, therefore, of prime interest to those who buy and sell over the sea in whatever part of the world they may be.

Antwerp has had an intensely interesting career as a port, but the story of its risings and fallings is rather in the province of the historian than the man of commerce; for perhaps more than is the case with any other great modern city, the present commercial importance of Antwerp is separate from its past glories. The rise of the old city to the position of the richest and most important European port of the Sixteenth Century, with a population of 125,000 people, was due to the geographical discoveries of the latter part of the previous century. Its decline, and the loss of half its population within 20 years was part of that series of mis-

fortunes that fell on it because of its location in one of those ill-fated political units that later became known as "buffer states." Its modern growth dates from the beginning of the Nineteenth Century when Napoleon realized the strategic importance, and started the construction of the present harbor and quay system. Its subsequent incorporation with the Kingdom of the Netherlands gave an impetus to its trade with the Dutch colonies, and established its position as a centre of inward and outward colonial trade, which since the unfortunate ten years from 1830 to 1839, has grown by leaps and bounds. As the best and most convenient entrance and exit for the world-trade of a rich and thickly populated manufacturing region which includes not only Belgium, but a part of northeastern France, and extends over into Germany, its position is established.

THE DOCK SYSTEM

The river Scheldt has a tidal variation at Antwerp of from 12 to 25 feet. The river along the city front is from 350 to 600 yards in width and admits at extreme low water vessels drawing 25 feet. The tidal variation has made necessary a system of docks with an unchanging water level for the convenient loading and unloading of smaller vessels; and the width and depth of the river have made possible the utilization of the front for the construction of a fine system of quays for the use of large ocean liners.

To the south of the city lie three small docks for the use of river craft, but the main system lies at the northern end and is collectively referred to as the Northern Docks. The oldest of these are the two known as the Petit and Grand Bassin, respectively. These were constructed by Napoleon (1804-1813), are lined with stone, represent an outlay of 13 million francs (\$2,600,000), and formed the original naval harbor. The smaller one can accommodate 100 and the larger 250 vessels of moderate tonnage, the smaller being 574 by 482 feet, and the larger 1,319 by 574. The two extend from west to east at right angles with the river. Between them there is an area formerly occupied by the warehouse of the Hanseatic League, which was destroyed by fire in 1893, and has been replaced by iron sheds. To the east of the Grand Bassin is the huge brick warehouse of the Entrepot Royal, and beyond that the principal freight stations of the railways.

At right angles with these two "Bassins," parallel with the river bank, and connected with the Grand Bassin by sluice gates is the Bassin du Kattendyk, which is the centre of the present dock system. This dock is about half a mile long and 328 feet wide, and can take care of vessels of the largest size. With the banks lined with large vessels, and the interior

literally packed with smaller craft this dock presents one of the busiest sights in the shipping world, and its crowded condition makes one realize that the demand for an enlargement of Antwerp's docking facilities has come none too soon.

About this dock are grouped a fine system of warehouses, and a series of drydocks, while on its east bank is the crane known as the "Groote Bok," with a lifting capacity of 120 tons. This dock is connected on the east with three very important smaller basins known respectively as the Bassin au Bois, the Bassin Asia, and the Bassin de la Campine. The main feature of interest in the equipment of these interior basins is the coal tip in the last named, which lifts loaded cars of 25 tons to a height of 40 feet and empties them into the ships at the rate of about ten per hour when at maximum speed.

Beyond this group of six docks, and lying at a short distance to the northwest, around a bend in the Scheldt, are the three large docks known as the Bassin Lefebvre, (with a huge grain elevator on the silo system) the Bassin Intercalaries, and the Bassin America, the most recent additions to the dock system of the port. These new docks are equipped with thoroughly modern loading and unloading machinery, and it is these, together with the wharves along the river front, that make Antwerp one of the best equipped of all modern harbors.

The series of nine quays, or wharves, along the river front, while not presenting the same appearance of congestion that is characteristic of the enclosed docks are of special interest and importance because of the fact that they are the landing-place of the ocean liners entering Antwerp. These quays which were constructed in 1879-1885 and enlarged in 1900-1901 have a frontage of over 3½ miles, and represent an outlay of about 100,000,000 francs (\$19,300,000). Along the entire shore side runs a railway line which connects with a network covering the entire dock and quay system of the city. Outside of this line is a long series of iron sheds designed as temporary shelter for goods during transfer to or from the ship. Still outside of these are double railway tracks running along the edge of the quays and over these operates one of the finest systems of hydraulic cranes to be found anywhere. Under the railways runs an elaborate hydraulic pressure line, supplied by pumping stations at either end of the dock system, and furnishing power not only for the operation of the cranes, but also for the operation of sluice gates, and the shunting of railway cars.

THE NEW HARBOR PLANS

For several years it has been apparent to those who looked toward the

future that Antwerp's commerce must in a very few years entirely outgrow her facilities for handling it. This time has approached more rapidly even than was predicted and since 1897 engineers have been at work considering various propositions that would make the port equal to any demands that are likely to be made on it for many years to come. A few months ago announcement was made of the completion of a plan which had received the sanction of King Leopold, and which now appears to have good prospects of materialization, as the Belgian Government has made liberal offers of financial assistance to the city.

The plan as announced will make the port of Antwerp larger than any in existence, giving it nearly 40 miles of running quays, making it practically three times its present size. It is estimated that the work will require an outlay of something like 250,000,000 francs (\$49,250,000) and will require about ten years for its completion.

Briefly, the plan is this. The present dock and harbor system will be left practically as it is, while a new dock system will be added consisting of a quarter circular canal, 815 feet wide and nearly 40 feet deep, running to the northwest to the Intercalaries Dock and connecting with the Scheldt, five miles away. With this canal will be connected a circular turning basin, a system of drydocks and nine huge loading and unloading docks with complete equipment of the most approved character. Between the two ends of this quarter-circular canal the Scheldt now makes a complete right angle, being in plan much like a bent human arm, with the northwest end of the canal resting on the shoulder, the southeast end in the hand and with the angle of the river at the elbow. The new plan includes the cutting of an entirely new bed for the Scheldt extending in a broad sweep from the shoulder to the hand inside the canal and roughly parallel with it. This will do away with three bad curves in the river and will give a channel to the sea which will not only be easy of navigation, but which will be much less subject to trouble from sandbars than the present one. The strip of land lying between these two new channels will be devoted to warehouse purposes, and there is a strong demand in favor of making it the free port for which Antwerp has for a long time clamored.

The regions of Western Germany, in competition with whose products the products of Belgium have of late years come, have been utilizing the cramped condition of the Antwerp port as an argument in favor of diverting trade to the port of Rotterdam. Up to the present the location of Antwerp has enabled her to hold her own against all such arguments. With the new extension added to her present equipment Antwerp will become one of the marvels of modern commerce.

Extending in a broad sweep to the east of the new dock plan there lies an area known as the Anvers Extension, embracing some 817 hectares (2019 acres), which it is proposed to devote to manufacturing and warehouse purposes, a project which is quite suggestive of Trafford Park in Manchester.—*Commercial America*, August, 1906.

THE NEW STATE OF OKLAHOMA.—On June 16 President Roosevelt signed the bill passed by the United States Congress admitting Oklahoma and Indian Territory into the union as one State with the name of Oklahoma. When the people of these Territories adopt a constitution in conformity to the Constitution of the United States the new State will formally become a member of the Union, which will make the forty-sixth State.

The new State of Oklahoma will have a population of a million and a half of people. It will have an area of 69,700 square miles. Formerly this entire Territory was called Indian Territory. In 1890 the Territory of Oklahoma was carved out of the western part, and the public strip known as No Man's Land. This country was thrown open to settlement in April, 1900, and in one day 50,000 settlers rushed into the Territory and occupied the lands. Migration has been rapid ever since, and a large part of the country has been developed and cities have been built and railroads constructed within its borders.

One thing that will make Oklahoma different from any other State will be its large Indian population. There are nearly 100,000 Indians within its borders, but practically all of these are living under civilized conditions.

The new State will include over 6,000 miles of railroad in operation, and will have ten cities of from 10,000 to 25,000 population.

Oklahoma will boast of great and varied resources. Agriculture and stock raising are the chief occupations of the people. Corn, wheat, oats, cotton and potatoes are the staples. Two crops of potatoes are raised on the same land in one year. The town of Ardmore has for years been known as the largest market for raw cotton in the United States. It is noted for its tremendous oil production, thousands of wells being now in operation and new territory is continually being developed. A fine quality of coal underlies an area estimated by the Interior Department as 400,000 square miles, and large companies have operated coal mines in this region for years. A beautiful granite has been found in vast quantities, and lesser quantities of iron ore; also cement and copper have been found over the State. In a few years Oklahoma will be in a class with the great States like Illinois and Iowa.—*The Catholic School Journal*.

A GEOGRAPHICAL EXHIBIT.—By the energetic work of Assistant Superintendent David B. Corson, of Newark, N. J., a noteworthy geographical exhibit has recently been made in the public library building of that city. In large part the exhibit consisted of work done by the pupils of the first seven grades in the public schools. In addition there were exhibits of maps and geographical books by publishers, government and state maps and publications, pictures, models, specimens and apparatus.

Superintendent Corson had arranged the pupils' work in regular order of sequence, beginning with the simple studies of the first grade and progressing step by step through to the end of the seventh year. Many novel ideas came out in the hundreds of pieces of work exhibited. One of the striking things was a set of four tables upon which were presented in miniature (1) an arctic scene with Esquimau hut, toy dogs and sledges, ice fields and the animals (toys) peculiar to the far North, (2) a plain in the temperate zone with a field of actual wheat, (3) a tropical jungle amid whose toy forests roamed toy animals, (4) a desert with its oasis and caravan of toy camels. Another was a large map of the United States with a board backing. In the appropriate places upon the map were attached, for example, wheat, rice, corn, coal, iron, gold, copper, etc., indicating the localities where these commodities are chiefly produced. The map work, models, compositions, and specimen test papers were all interesting and reflected credit upon the Newark schools. Many visitors came from a distance to see the exhibit. Among them was a delegation of forty from the Brooklyn Teachers' Association. A regular schedule of visiting hours was arranged so that all of the classes in the public schools, with their teachers, inspected the exhibit and received the inspiration which it afforded. Superintendent Corson testifies that already he sees the beneficial effect of the exhibit upon the geography work throughout the city.—*R. H. W.*

THE COMMERCIAL FACTOR AND ITS PLACE IN GENERAL GEOGRAPHY.—With limited time at my disposal perhaps I can be of most service in the discussion of this topic by indicating very specifically the place of the commercial element in geography, and its relation to the other phases of geography as one might use it in the grades and in the presentation of a continent, for example, North America.

A logical analysis of the subject-matter to be studied will suggest some such outline as the following:

1. *Location, Size, Outline.* Under which one would wish to emphasize the wide range in latitude, from 9° N. to 72° N. latitude, and this is of greatest significance in furnishing a wide variety of climates. The

position with reference to other continents shown as giving us a great advantage in being Europe's nearest great commercial neighbor, and as having our southern ports so close to the north and west coasts of South America as to give us a practical monopoly in the trade of those regions. As to size (omitting the Arctic islands) the fact that we are practically the same size as South America and a little over half the size of Africa. Yet that this great size avails us little, since so great a fraction lies in the inhospitable northern latitudes. The detailed outline showing us many indentations and good harbors in high latitudes and a relative absence of harbors in all low latitudes.

2. *Surface.* Under which we must fix some generalizations: That the Great Highland is close to the west coast, so in a position to interfere most strongly with the rainfall distribution, and hence with the potential wealth of the continent; that the eastern highland is insignificant as a climatic barrier, but, in the nature of its folds and passes, of very great significance as a barrier to trade. For example, the supremacy of New York city depending upon a position of advantage with reference to the best pass across this barrier. That the great flat plain of the center of the continent is the largest invitation to population and wealth. That the position of the major axes of drainage, the St. Lawrence system leading eastward from this rich plain, and the Mississippi leading southward, is of most vital commercial importance.

3. *Climate and Life.* Certain broad lines of climatic influence must be held face to face with the quality and distribution of our main sources of wealth. The incompetence of Canada, with an area as large as our own, must be seen as due to a lack of heat depending upon high latitude, and the Cordilleran interference with winds and rain. That the really great productive part of our realm is due to the humidity of the eastern half of it, this in turn due to a lack of a barrier at south and east; and to the procession of cyclonic storms passing eastward across our area. The zonal distribution of vegetation must be noticed as due to the heat distribution over this area, cotton stopping with the Lower Austral realm, the cereals found at their best in the Upper Austral realm, the forests responding to an ample supply of rain well distributed through the year. That the industrial possibilities vary almost exactly with the rainfall; the cities thinning out with decrease of rain; the railways having a thick network on rich areas, and stopping short with the isohyet of twenty inches per year. That even population density responds directly to the great factor of rain, and the lesser factors of soil and surface.

4. *Industry and Commerce.* Such an arrangement of factors brings us logically to the real matter of commercial geography. In which the important matter is not so much statistics of values and quantities of production as an interpretation of the facts of production. We want the main facts, of course, but merely as materials to think with. The real value of the study lies in an ability to trace results back to causes. It is of interest to know that last year we produced 2,700,000,000 bushels of corn, worth about \$1,300,000,000. But if we stop there, we have lost an opportunity for a bit of real education. We should look back of this fact with the question: Why? And the answer will run: Here is an area of a million square miles of lowland, the major portion of which is very flat, and covered with a rich soil; the best part of this soil being a new soil, transported and ground up by the continental ice-sheet and put into magnificent shape for cultivation. The flat plain has no barrier at the south and but little at the east, and the winds of the cyclones bring ample rain in from the Gulf of Mexico, and follow these rains with ample sunshine. These rich lands have been exploited by pioneers, free, energetic, independent; conditions which make hired labor hard to get, and a pressing invitation is thus issued for labor-saving machinery, and the flat surface and fine soil make it possible to use such machinery to advantage. So we have gang plows by which one man may turn six acres of ground per day, and steam plows by which two men may turn forty acres in a day. These lands are harrowed by machines which will stir a strip of soil from ten to thirty feet wide, so that a man may cover from thirty to ninety acres per day. The seed is sowed by a horse-drawn and automatic machine, with which one man may plant from twenty to thirty acres a day. The corn is cultivated by two-horse, or even three-horse, sulky plows, by which a man may cultivate one or two rows at a time. When the corn is ripe, a harvesting machine, driven by one man, will cut and bind, and in some cases shock, ten to fifteen acres a day. Then a machine husks and shreds the corn from many acres in a day, and makes it ready for feeding to the stock. All of these labor-saving devices make it possible to raise corn at a cost of ten cents per bushel. This corn then is fed to hogs and cattle, and in the form of meat and dairy produce finds a market everywhere. But this market is good and hence the invitation to raise corn is pressing, in proportion to the efficiency and transportation facilities, and in proportion as freight rates are low. The surface makes railway building easy, the competition of many roads, and the competition of the Great Lakes for the great east-west flow of commodities, have given us the lowest freight rates

in the world, hence the widest market for our corn products, and hence a larger invitation for a great production.

Our great corn crop is, by such a study, more than a mere numeric running to ten places. And I suspect that we might thrive on much fewer statistics in our secondary teaching were we to choose wisely what statistics we deal with, and put more emphasis on the causal sequences involved, in a smaller list of commodities. For commercial geography in any grade is more than lists of figures. In fact, if it be merely lists of figures it is not geography at all, and may be merely a burden to the life of the pupil, and teacher, too. Commercial geography is then really a point of view, or almost, as one might say, a frame of mind. It is a study of the problems of commerce as outgrowths, or expressions, of the interactions of geographic factors. We may take this point of view in our presentation of geography in any grade. Exercises in it will serve to show the pupil the ways in which the forces and forms he is studying are at work in the great world of business into which he so soon will graduate. In the ordinary work of the grades, it will be merely the last term in a topical treatment of a region, in which the student may gradually perceive that geography has a message for him in practical, every-day experiences, and so there may be brought into the study of geography that intense element of the practical, that has always given arithmetic supremacy in common school work. In the high school, of course, commercial geography has a status of its own, in which the student will be the gainer for all the good work that may have been done for him in the grades. But the discussion of commercial geography in the high school curriculum is another story, which I shall not attempt to discuss at this time.—*J. Paul Goode in Educational Bi-Monthly.*

GEOGRAPHY IN AMERICAN UNIVERSITIES.—It is told of Dr. Jowett of Oxford, that when the question of establishing a chair of geography at Oxford was being discussed, he asked of one of his advisers: "Can geography be taught so as to make men think?" That the answer he received was an affirmative one may be inferred when it is known that Oxford today has a department of geography with a well organized staff of readers, teachers, and lecturers covering various departments of the science.

This recognition of geography by one of the oldest and most famous of English universities, marked an epoch in the development of this department of science. It is true that for many years previous to its establishment in the universities of England, the universities of Germany had recognized the importance of the study of geography and had offered

courses in its various branches; and that, influenced by the universities, the primary and secondary schools of Germany have become famous for their teaching of geography. The action of Oxford, however, exerted a more direct influence on the western world, and was gratifying to those teachers and students who realize that what is needed is the establishment of geography on a scientific basis, and, furthermore, that such a basis can be reached only through the endowment of chairs in universities, which will enable learned men to devote their whole time to teaching and to geographical research. Other English universities have followed the lead of Oxford, and there are now no less than thirteen institutions of learning in which geography is recognized. Cambridge has gone even further than Oxford, and requires geography in her examination for an A. B. degree.

Whatever advance the American schools have made in geography teaching during the past few years cannot be traced to the universities as organizations, but to a few thinkers, often university men, whose writings and lectures have done much to reform the old-time conception of geography. The suggestions furnished by these men, and worked out and elaborated by many teachers of the present day, account for the great advance. It is a question whether or not the schools would have attained greater efficiency if the reform had been instituted by the higher institutions of learning, but certain it is that before much further progress is possible the boundaries of geography must be mapped out, and the relation of its parts so defined as to place it in its proper place among the other sciences. This work, it is evident, must be done by the universities.

An examination of the courses of study of several of our leading universities for 1906 shows that American institutions are far behind the English in their recognition of geography. If we except physical geography, in which subject almost all of the institutions offer courses in connection with the study of geology, we find little work offered in this subject. Although Harvard has a department of geology and geography, physical geography only is offered. Yale offers both physical and commercial geography in its geology department. Columbia offers a choice of five courses in its Teachers College. The catalogues of Dartmouth, Amherst, Boston University, Ann Arbor, and Leland Stanford advertise courses in physiography only. Although it has no department of geography, the University of California offers two courses which show its recognition of the value of scientific geographic training:—I. An introduction to Economic Geography, including the elements of Scientific Geography; II. The Geography of International Trade. For each of these courses three hours per week during a half year is required.

So far as reports show, the University of Chicago is the only American university having a department of geography. This department was established in 1903, and the courses it offers are such as tend to advance the subject of geography to its right position among the sciences. One of the courses offered this year is as follows: "The Influences of Geography on American History. A study of the geographic conditions which have influenced the course of American history. Their importance as compared with one another and their importance as compared with non-geographical features." Various writers on history have devoted more or less space to a consideration of the influence of environment on the development of a people, but, so far as is known, this is the first attempt of any American university to present in a formal manner the geographical aspects of history. It is work of this kind which confirms the truth of what was said some years ago by H. J. McKinder, M. A., reader in geography in the University of Oxford. He writes as follows: "It appears to me, therefore, that in the present decade we are for the first time in a position to attempt with some degree of completeness a correlation between the larger geographical facts and the larger historical generalizations. For the first time we can perceive something of the real proportion of features and events on the stage of the whole world and may seek a formula which shall express certain aspects of a geographical causation in universal history."

History is not the only subject with a geographical aspect. The subjects of archeology, of commerce, of colonization, has each its geographic setting, and even the studies of botany and zoölogy are dependent upon geographic conditions for the development of their ecological side. And yet, despite all this wealth of material, and despite a crying demand for higher instruction in a subject so necessary, most of the American universities have done next to nothing.—*Jane Perry Cook in Educational Bi-Monthly.*

SUPPLEMENTARY READING.—The September number of the *Journal of Geography* contains an article on "What a child should know at the end of its School Course," which deserves the attention of teachers. The author, Mr. W. C. Moore, points out that the prudent teacher must be prepared for the fact that the child will forget almost all the details which he has learned, and that therefore the aim of the whole geographical course should be to make sure that the unforgettable residue will be something of real value to the citizen—a habit of mind, a comprehension of the geographical mode of looking at phenomena. Stress is laid upon the need of supplementing text-book teaching by reference to current events, to the

contents of the newspapers, the magazines, the consular reports, and so on, in so far as they relate to geography. This not only makes the facts of geography real and living, but it establishes a habit of consulting atlas and book of reference in connection with periodical literature which is of permanent value. The need referred to seems to us real and clamant, and the daily increasing pile of geographical text-books and readers on the editorial table seems to us to further suggest the question whether the production of geographical school books is not in danger of being carried to excess. In the dark days when "scientific" geography was in its infancy, boys and girls were at least often encouraged to read for themselves the great books of travel, to follow, for instance, Livingstone's track across the unknown wastes; but now apparently they are supposed to be satisfied with an extract in a "Geographical Reader," while the *Travels* are left to grow dusty on the shelf. There is, of course, much to be said for the geographical reader, just as there is much to be said for the deluge of text-books, but surely there lurks in both a real danger also. We do not want the youthful mind to be fed entirely on the intellectual equivalent of "digested breakfast food." Nowadays almost every town of any size has its public library with both reference and lending departments. Would it not be better if, in place of swallowing the most irreproachable of text-books, the senior pupils at least were taught how to use the resources of a library, and how to deal with first-hand material, with blue-books, reports, and all that wealth of material which pours in upon any library? Further, rather than reading the most admirably arranged collection of scraps from famous books of travel, are they not better employed in reading for themselves the original books and being trained to give an account in their own words of the salient points.—*Scottish Geographical Magazine*.

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THE CHARACTERISTICS OF THE ZONES: III.—THE POLAR ZONES'

By ROBERT DE C. WARD,
Harvard University

¹See this *Journal*, pp. 302-319, 337-351, for Parts I and II. In addition to authorities previously cited, reference has been made to the meteorological results obtained by the recent Arctic and Antarctic expeditions in the *Fram*, *Gauss*, *Discovery*, *Scotia*, *Belgica*, *Southern Cross*, etc.

The following charts will prove of value to those who wish to make a more detailed study of the meteorology of the polar regions: Monthly north polar isobars, isotherms and isanomalies; mean annual isotherms and isanomalies; annual migration of isotherms, Pls. XI-XX, *The Norwegian North Polar Expedition, 1893-1896, Scientific Results* edited by Fridtjof Nansen. Vol. VI. Meteorology. By H. Mohn, 1905. Text, pp. 570-576.

Monthly north polar isotherms, isobars and winds. *Report on Atmospheric Circulation*, By A. Buchan. "Challenger" Expedition, London, 1889.

North polar isotherms, isobars and winds for alternate months; mean annual isotherms and isobars based on simultaneous observations made at noon, G. M. T. Bartholomew's *Atlas of Meteorology*, Pls. 1, 4, 11, 13. Text, pp. 7, 10, 13, 14-15.

Annual storm tracks and frequency, based on International Meteorological Observations, *ibid.*, Pl. 28. Text p. 27.

Mean annual isotherms for south polar area (1902-3), and world chart of mean annual isotherms extended to include latitudes 60°-80° S. "Kaltepole und Eistriften der Antarktis in den Jahren 1902 bis 1903." By W. Krebs. *Das Weltall*, IV, 1904, 442-444.

Mean winter and mean summer isotherms for south polar area. "La Température des Pôles." By C. Passerat. *Annales de Géographie*, XIII, July 15, 1904, pp. 289-295.

The charts of isotherms, isobars and winds around the south pole in February (largely hypothetical), after Dr. Buchan and Sir John Murray, published in 1895 (*Scot. Geogr. Mag.*) are also interesting.

Synopsis

General: Relation to man, animals and plants.—Temperature.—Pressure and winds.—Rain and snow.—Humidity, cloudiness and fog.—Cyclones and weather.—Twilight and optical phenomena.—Physiological effects.

General: relation to man, animals and plants. The temperate zones merge into the polar zones at the Arctic and Antarctic circles or, if temperature is used as the basis of classification, at the isotherms of 50° for the warmest month, as suggested by Supan. The frequent use of maps on the Mercator projection tends to give us an exaggerated idea of the size

of the polar zones. When limited by the polar circles, these zones occupy but 0.08 of the surface of each hemisphere, the whole area being 1.00. Astronomically they are distinguished by the fact that at all places within them the sun is above the horizon at least one full twenty-four hours, and below it the same length of time. This longer or shorter absence of the sun gives the climate a peculiar character, not found elsewhere. At the poles, the day and the year are alike. These zones obviously have the most oblique insolation.

For but a very small part of the polar zones have we any knowledge, by observation, of the *climate*. The fragmentary records of the earlier expeditions gave scattering information about the weather. The longer and more complete records of recent expeditions give much more accurate and satisfactory results. It is now becoming possible to see more clearly what the climatic conditions really are. But as yet no scientific presentation of polar climatology is possible. We are still dealing with the meteorology of the polar zones, rather than with their climates. More is known of the Arctic than of the Antarctic. From the latter there are already several excellent contributions, but up to this time no record both as long and as complete as that of the Nansen Expedition has been obtained. The admirable report, by Dr. Mohn, on the results of this expedition, embracing three years' observations, discussed with great care, and well illustrated by curves and charts, is a monumental piece of work. Under the able directorship of Mr. Walter G. Davis, however, the Argentine Meteorological Service is steadily accumulating observations at its far southern stations, on the South Orkney and South Shetland Islands, and although these stations are not within the Antarctic zone, they will furnish valuable information concerning the great ocean area surrounding this zone.

Beyond the isotherm of 50° for the warmest month, forest trees and cereals do not grow. In the northern hemisphere this line is well north of the Arctic circle in the continental climate of Asia, and north of it in northwestern North America. It is north of it also in northern Scandinavia, but falls well south in eastern British America, Labrador and Greenland, and also in the North Pacific Ocean. In the southern hemisphere this isotherm crosses the southern extremity of South America, and runs nearly east and west around the globe. The conditions of life are necessarily very specialized under the peculiar climatic features which are met with in these zones. There is a minimum of life, but more in the north polar than the south polar zone, and our knowledge is confined chiefly to the former area. Plants are few and lowly. Land animals

which depend upon plant food must therefore likewise be few in number. Farming and cattle-raising cease. The reindeer, which manages to find sufficient food in the lowly Arctic vegetation, is the mainstay of many of the Arctic natives. But the reindeer must wander far and wide in search of their moss. And many reindeer are needed to provide sustenance for one man. Population is small and scattered. There are no permanent settlements at all within the Antarctic circle. Life is hard; a constant struggle for existence. Man seeks his food by the chase on land, but chiefly in the sea. It has been well said that with every degree of higher latitude, man is more forced to obtain his food supply from the sea. He lives along, or near, the sea coast. The interior lands, away from the sea, are deserted. Gales, and snow, and cold cause many deaths on land, and also, especially during fishing expeditions, at sea. It has been estimated that about one-twenty-fifth of the population of Iceland perishes through being lost in snowstorms; by freezing; or by drowning. Under such hard conditions of securing food, famine is a likely occurrence. The polar limit of permanent human settlements is believed by Bessels to be fixed, not by the decreasing temperature, but by the increase in the length of the night, which shortens the time during which man can lay up food by hunting and fishing.

In the Arctic climate, vegetation must make rapid growth in the short, cool summer. In the highest latitudes, the summer temperatures are not high enough to melt snow on a level. Exposure is therefore of the greatest importance. Arctic plants grow and blossom with great rapidity and luxuriance where the exposure is favorable, and where the water from the melting snow can run off. The soil then dries quickly, and can be effectively warmed. On the other hand, when the water stands, it may freeze again and again, and the soil underneath has no opportunity to warm. Of Nova Zembla, Baer has reported that the level surfaces are polar deserts, while the slopes at the foot of the mountains, unless covered with boulders, are like gardens in summer. Protection against cold winds is another important factor in the growth of this vegetation. Over great stretches of the northern plains the surface only is thawed out in the warmer months, and swamps, mosses and lichens are found above eternally frozen ground. Trees often grow in favorable conditions along streams when the intervening plains are typical tundras. Direct insolation is very effective in high latitudes. Where the exposure is favorable, snow melts in the sun even when the temperature of the air in the shade is far below freezing. It has been reported that at Assistance Bay (lat. $74\frac{1}{2}^{\circ}$ N.)

in March, when the air temperature was about -25° , snow near stones and other dark objects melted in the sun. Even the mean daily temperature of the snow surface may be higher than the air temperature. The injurious effect of polar climate upon vegetation, especially upon trees, has been attributed by Kihlmann to an insufficient water-supply furnished by the roots deep in the cold ground. From the upper parts of the tree, exposed to sunshine and wind, evaporation proceeds rapidly, and the tree

January



FIG. 1.
January North Polar Isotherms.

dries up. Protective devices against excessive evaporation, not unlike those of desert plants, are found.

Arctic and Antarctic zones differ a good deal in the distribution and arrangement of land and water around and in them. The southern zone is surrounded by a wide belt of open sea; the northern, by land areas. The northern is therefore much affected by the conditions of adjacent continental masses. Nevertheless, the general characteristics are apparently much the same over both, so far as is now known, the Antarctic differing from the Arctic chiefly in having colder summers and in the regularity of its pressure and winds. The cold Antarctic summers are the

chief cause of the poverty of the Antarctic flora. Both zones have the lowest mean annual temperatures in their respective hemispheres, and hence may properly be called the *cold zones*. The designation *cold* is distinctly preferable to *frigid*, but *polar* is to be preferred to either.

Temperature. At the solstices, the two poles receive the largest amounts of insolation which any part of the earth's surface ever receives. It would seem, therefore, that the polar temperatures should then be the

July



FIG. 2.
July North Polar Isotherms.

highest in the world, but as a matter of fact they are nearly or quite the lowest. Temperatures do not follow insolation in this case because much of the latter never reaches the earth's surface; because most of the energy which does reach the surface is expended in melting the snow and ice of the polar areas; and also because the water areas are large, and the duration of insolation is short. Hence the mean annual temperatures at both poles are nearly, or quite, the lowest in the world.

A set of monthly isothermal charts of the north polar area, based on all available observations, was prepared by Mohn and published in the

volume on Meteorology of the Nansen Expedition. These charts give the most authentic information now at hand regarding Arctic temperatures. In the winter months there are three cold poles, in Siberia, in Greenland and at the pole itself. In January, the mean temperatures at these three cold poles are -49° , -40° and -40° respectively.

The Siberian cold pole becomes a maximum of temperature during the summer, but the Greenland and polar minima remain throughout the year. In April the lowest isotherm, -22° , is in Greenland, the North Pole is then within the area enclosed by -18.4° . In July the temperature distribution shows considerable uniformity: the gradients are relatively weak.

A large area in the interior of Greenland, and one of about equal extent around the pole, are within the isotherm of 32° . Hence the statement frequently made that no places in the northern hemisphere have mean temperatures below freezing in July is not correct. In October the interior of Greenland is enclosed by -13° , and at the pole we find -11.2° . For the year

Isotherms. Year.



FIG. 3.

Mean Annual North Polar Isotherms.

a large area around the pole is enclosed by the isotherm of -4° , with an isotherm of the same value in the interior of Greenland, but a local area of -7.6° is noted in Greenland, and one of -11.2° is centered at lat. 80° N. and long. 170° E. It will be seen that the temperatures are relatively lower towards the eastern sides of the great continents. The ordinary mean annual isothermal chart shows, within the Arctic circle, temperatures of 40° off the Norwegian coast and -5° beyond lat. 75° N. north of Asia and North America. The January chart shows 30° off the Norwegian coast, and -60° at Verkhoyansk, in Siberia. The July chart shows 60° over the continents to 40° in extreme northeastern Asia.

The north polar chart of annual range of temperature shows a maximum range of about 120° in Siberia; of 80° in North America; of 75.6° at the North Pole, and of 72° in Greenland. The North Pole obviously has a continental climate. The minimum ranges are on the Atlantic and Pacific Oceans. The mean annual isanomalies show that the line of zero anomaly passes through the pole (as it must do). The interior of Greenland has a negative anomaly in all months. The Norwegian sea area is 45° too warm in January and February. Siberia has $+10.8^{\circ}$ in summer, and -45° in January. Between Bering Strait and the pole there is a negative anomaly in all months. The influence of the Gulf Stream drift is clearly seen on this chart, as it is also on that of mean annual ranges.

The mean temperatures of the higher northern latitudes in January, July and for the year, have been determined by Mohn with the following result:

Mean Temperatures of the Higher Northern Latitudes.

	60°	65°	70°	75°	80°	85°
Jan.	$+3.0^{\circ}$	-9.4°	-15.3°	-20.2°	-26.0°	-36.6°
July	57.4	54.3	45.1	38.1	35.6	32.5
Year	30.0	21.6	12.7	5.5	-0.6	-6.2

For the North Pole itself, Mohn gives the following results, obtained by graphic methods:

Mean Temperatures at the North Pole.

Jan.	Feb.	Mar.	Apr.	May	June	July
-41.8°	-41.8°	-31.0°	-18.4°	8.6°	28.4°	30.2°
Aug.	Sept.	Oct.	Nov.	Dec.	Year	
26.6°	8.6°	-11.2°	-27.4°	-36.4°	-8.9°	

It appears that the region about the North Pole is the coldest place in the Northern hemisphere for the mean of the year, and that the interior ice desert of Greenland, together with the inner polar area, are together the coldest parts of the northern hemisphere in July. In January, how-

ever, Verkhoyansk, in northeastern Siberia, just within the Arctic Circle, has a mean temperature of about -60° , while the inner polar area and the northern interior of Greenland have only -40° . Future exploration in the immediate vicinity of the North Pole may show a lower January mean temperature there than at present appears. Such exploration will, moreover, certainly necessitate readjustment of the isothermal lines as now drawn for this polar area. It may be noted that the isotherm of 32° in January crosses the Arctic Circle in the northeastern Atlantic. Elsewhere it is south of this line. By December all land within the Arctic Circle is below the freezing point. Thus far no minima as low as those of northeastern Siberia have been recorded in the Arctic, and the Arctic maxima are much lower.

For the Antarctic our knowledge is still very fragmentary, and relates chiefly to the summer months, but the numerous well-equipped expeditions of the last ten years have brought back very valuable results, extending in a few cases over all parts of the year. On the February South Polar isothermal chart published in 1898 (after Buchan) the isotherm of 30° was shown essentially coincident with the Antarctic circle, while a part of the isotherm of 25° was drawn inside of the circle. Using the newest data available, Hann has determined the mean temperatures of the higher southern latitudes as follows:¹

Mean Temperatures of High Southern Latitudes.

S. Lat.	50°	60°	70°	80°
Mean Annual	41.9°	28.4°	11.3°	-3.6°
January	46.9	37.8	30.6	20.3
July	37.2	18.3	-8.0	-24.7

These temperatures can be compared with those given on page 439, for northern latitudes. From lat. 70° S. polewards, Hann finds that the southern hemisphere is colder than the northern. Antarctic summers are decidedly cold. The mean temperature of the warmest month over the whole Antarctic zone is below the freezing point,² while within the Arctic Circle mean temperatures above 32° are generally found, except in the interior of Greenland and around the pole. These low temperatures of the south polar summer, which are probably due to the great continental mass of ice around the South Pole, are responsible for much of the difficulty and disagreeable quality of Antarctic exploration. They prevent much melting of snow and ice, and are monotonous and depressing. The mean an-

¹ *Nature*, Jan. 5, 1905, p. 221.

² At Cape Adare, a mean January temperature of slightly over 32° was obtained on one expedition, under abnormally favorable conditions.

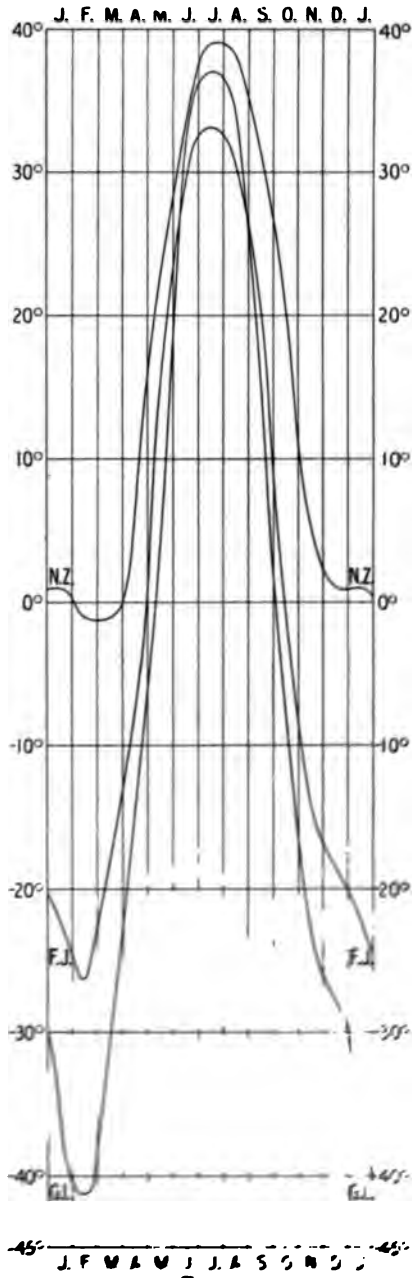


FIG. 4
Annual March of Temperature: Polar Type.
N. Z.—New Zealand F. J.—Franz Joseph's Land G. L.—Greenland Land.

nual temperatures experienced have been in the vicinity of 10° , and the minima of an ordinary Antarctic winter go down to -40° and below, but so far no minima of the severest Siberian intensity have yet been noted. The British expedition on the *Discovery*, recorded -67.7° at Cape Armitage at noon, May 16, 1903. The maxima have varied between about 35° and 50° .

The temperatures at the South Pole itself furnish an interesting subject for speculation. It is likely that near the South Pole will prove to be the coldest point on the earth's surface for the year, as the distribution of insolation would imply, and as the conditions of land and ice and snow there would suggest. There is, however, room for doubt whether the lowest mean annual temperature will be at the mathematical pole. It is almost certain that the lowest winter and summer temperatures in the southern hemisphere will be found in the immediate vicinity of the pole. One attempt to draw isotherms for the Antarctic zone, on the basis of the recent data, is that of Passerat,¹ who has charted the mean winter and mean summer temperatures. Obviously these charts are based on extremely incomplete data, and can only be regarded at best as tentative in the highest degree. On the mean winter chart, the isotherm of -4° (-20°C.) is mostly within the Antarctic Circle, and in places well within it, while -13° (-25°C.) appears between lats. 70° and 80° on Graham Land and Victoria Land. On the mean summer chart the isotherm of 32° (0°C.) is about half within and half without the Antarctic Circle, and partly within lat. 70° . The isotherm of 23° (-5°C.) appears on Victoria Land, between lats. 70° and 80° . Krebs has attempted to draw isotherms for the far southern latitudes, using the data collected during the years 1901-1904. The isotherms on the mean annual isothermal chart of the world given in Hann's *Lehrbuch der Meteorologie* have been extended to include latitudes up to 80° S. The lowest temperature shown is indicated by portions of the isotherm of -4° at about latitude 80° S.

It must not be supposed that the isotherms in the Antarctic region run parallel with the latitude lines. They bend polewards and equatorwards at different meridians, although much less than in the Arctic.

The annual march of temperature in the north polar zone, for which we have the best comparable data, is peculiar in having a much-retarded minimum, in February or even in March—the result of the long, cold winter. The temperature rises rapidly towards summer, and reaches a

¹ See reference above. Note also reference to *Scot. Geogr. Mag.*, 1898.

maximum in July. Autumn is warmer than spring. Winter comes on gradually, the summer slowly "falling asleep." The polar type of annual march of temperature is illustrated in the accompanying curves: (See Fig. 4.)

The continents do not penetrate far enough into the Arctic zone to develop a pure continental climate in the highest latitudes. Verkhoyansk, in lat. $67^{\circ}6'$ N., almost on the Arctic Circle, furnishes an excellent example of an exaggerated continental type for the margin of the zone, with an annual range of 120° . One-third as large a range is found on Nova Zembla. The diurnal period of temperature is noted during the time when the sun is visible, but is hardly, or not at all, perceptible during the dark season. During the latter, according to the *Fram* observations, the day hours are usually colder than the night hours. This appears to be an effect of winds, for colder, northerly winds prevailed during the hours of daytime, and milder, southerly winds by night. Polar climate as a whole has large annual and small diurnal ranges, but sudden changes of wind may cause marked irregular temperature changes within twenty-four hours, especially in winter. The small ranges are associated with greater cloudiness, and *vice versa*. The mean diurnal variability is very small in summer, and reaches its maximum in winter, about 7° in February, according to Mohn.

Pressure and Winds. Owing to the more symmetrical distribution of land and water in the southern than in the northern polar area, the pressures and winds have a simpler arrangement in the former, and may be first considered. Recent Antarctic exploration has considerably modified some of the views which have been held regarding the general winds of the south polar area, and their controlling pressures. The rapid southward decrease of pressure, which is so marked a feature of the higher latitudes of the southern hemisphere on the isobaric charts of the world, does not continue all the way to the south pole. Nor do the prevailing westerly winds, constituting the "circumpolar whirl," which are so well developed over the southern portions of the southern hemisphere oceans, blow all the way home to the south pole. The steep poleward pressure gradients of these southern oceans end in a trough of low pressure, girdling the earth at about the Antarctic Circle. From here the pressure increases again towards the south pole, where a permanent inner polar anticyclonic area is found, with outflowing winds deflected by the earth's rotation into easterly and southeasterly directions. A chart of the South Polar isobars for February (after Sir John Murray and Dr. Buchan), published in

1898, showed a pressure of 29.00 inches in the low pressure girdle, and the isobar of 29.50 inches around the inner polar area. These easterly winds have been observed by the recent expeditions which have penetrated far enough south to cross the low pressure trough. The limits between the prevailing westerlies and the outflowing winds from the pole ("easterlies") vary with the longitude and migrate with the seasons. The change in passing from one wind system to the other is easily observed. The *Belgica*, for example, in lats. $69\frac{1}{2}^{\circ}$ - $71\frac{1}{2}^{\circ}$ S., and longs. 81° - 95° W., was carried towards the west by the easterly winds in summer, and in winter was driven east by the westerlies, and then again to the west. The *Belgica* thus lay in winter on the equatorial and in summer on the polar side of the trough of low pressure. On the other hand, the English expedition at lat. $77^{\circ} 50'S.$, was persistently on the polar side of the trough, with dominant S. S.E. and E. winds. The smoke from Mt. Erebus, however, showed prevailing southwesterly currents. The German expedition on the *Gauss* was also under the régime of the easterly winds during its stay in winter quarters. The *Belgica* had fewer calms than some stations nearer the pole. This south polar anticyclone, with its surrounding low pressure girdle, migrates with the season, the centre apparently shifting polewards in summer and towards the eastern hemisphere in winter. The outflowing winds from the polar anticyclones sweep down across the inland ice and are usually cold. Under certain topographic conditions, descending across mountain ranges, as in the case of the Admiralty Range in Victoria Land, these winds may develop high velocity and take on typical foehn characteristics, raising the temperature to an unusually high degree. From the fact that certain warm southerly winds have been reported from the mountainous eastern coast of Victoria Land, as being damp and snow-laden, Sir Clements Markham has suggested that they come from an open ocean to the south, beyond the south pole. Foehn winds have been noted in the South Orkneys, from W.N.W. They are also known on both coasts of Greenland, when a passing cyclonic depression draws the air down from the icy interior. These Greenland foehn winds are important climatic elements, for they blow down warm and dry, raising the temperature even 30° or 40° above the winter mean, and melting the snow.

In the Arctic area the wind systems are less clearly defined and the pressure distribution is much less regular, on account of the irregular distribution of land and water. The isobaric charts published in the report of the Nansen Expedition show that the North Atlantic low pressure area is more or less well developed in all months. Except in June, when it lies

over southern Greenland, this tongue-shaped trough of low pressure lies in Davis Strait, to the southwest or west of Iceland, and over the Norwegian Sea. In winter it greatly extends its limits farther east into the inner Arctic Ocean, to the north of Russia and Siberia. Between May and August it is much less well developed. The Pacific minimum of pressure is found south of Bering Strait and in Alaska. Between these two regions of lower pressure, the divide extends from North America to eastern Siberia. This divide has been called by Supan the "*Arktische Windscheide*." High pressures are found in North America and in Siberia from September to March, the maxima being in Asia. The belt of somewhat lower pressure connecting these two maxima is situated between Bering Strait and the North Pole. In July and August the maximum pressure is between Greenland and somewhat east of Spitzbergen. The pressure gradients are steepest in winter. At the pole itself pressure seems to be highest (about 30.079 ins.) in April and lowest (29.882 ins.) from June to September. The annual range is therefore only about 0.20 in.

The prevailing westerlies, which in the high southern latitudes are so symmetrically developed, are interfered with to such an extent by the varying pressure controls over the northern continents and oceans in summer and winter that they are often hardly recognizable on the wind maps. The isobaric and wind charts prepared by Buchan show that on the whole the winds blow out from the inner polar basin, especially in winter and spring.

In the European and North American polar areas the annual march of pressure gives a spring maximum, in April and May, and a minimum in January or February. The daily fluctuations in pressure in these circum-polar latitudes are about twice as large in winter as in summer.

Rain and Snow. Rainfall on the whole decreases steadily from equator to poles. The amount of precipitation must of necessity be comparatively slight in the polar zones (15-10 ins., and less), chiefly because of the small capacity of the air for water vapor at the low temperatures there prevailing; partly also because of the decrease, or absence, of local convectional storms and thunder showers.¹ Even cyclonic storms cannot yield much precipitation. The polar zones therefore have a permanent deficiency of precipitation. Their deserts of snow and ice are climatic deserts in more senses than one. These extended snow and ice fields naturally tend to give an exaggerated idea of the actual amount of precipitation.

¹ Locally, under exceptional conditions, as in the case of the western coast of Norway, the rainfall is a good deal heavier.

It must be remembered, however, that evaporation is slow at low temperatures, and melting is not excessive. Hence the polar store of fallen snow is well preserved: interior snow fields, ice sheets, and glaciers are produced. Nansen is of the opinion that the amount of condensed vapor, much of it being in the form of "frozen fog" (hoarfrost) and not readily measurable, exceeds evaporation in the polar districts.

The commonest form of precipitation is naturally snow, the summer limit of which, in the northern hemisphere, is near the Arctic Circle, with the exception of Norway. In lat. 70°N. , at Boothia Felix, 40 per cent. of the precipitation from June to August comes in the form of snow. So far as exploration has yet gone into the highest latitudes, rain falls in summer, and it is doubtful whether there are places near sea level where *all* the precipitation falls as snow. It is also uncertain whether any mountains reach a height where nothing but snow falls. Von Drygalski believes that the inland ice cap of Greenland, over 2600 feet above sea level, meets these conditions. The snow of the polar regions is characteristically fine and dry. Schwatka has pointed out that the snow huts of the Eskimos could not be built with the kind of snow that falls in the United States. At low polar temperatures *flakes* of snow are not found, but precipitation is in the form of ice spicules. The finest glittering ice needles ("diamond dust") often fill the air, even on clear days and in calm weather, and gradually descending to the surface, slowly add to the depth of snow on the ground. Dry snow is also blown up from the snowfields on windy days, interfering with the transparency of the air. Snowfalls at temperatures of -40° and even below have been reported from eastern Siberian and Arctic stations. It is probable that under these conditions the air is warmer aloft.

Humidity, cloudiness, and fog. The absolute humidity must be low in polar latitudes, especially in winter, on account of the low temperatures. Relative humidity varies greatly, and very low readings have often been recorded. Cloudiness seems to decrease somewhat towards the inner polar areas, after passing the belt of high cloudiness in the higher latitudes of the temperate zones (see Table, p. 342). In the marine climates of high latitudes, the summer, which is the calmest season, has the maximum cloudiness; the winter, with more active wind movement, is clearer. The data and curve given below illustrate these conditions. The summer maximum is largely due to fogs, which are produced where warm damp air is chilled by coming in contact with ice. They are also formed over open waters, as among the Faeroe Islands, for example, and open water spaces, in the midst of an ice-covered sea, are commonly detected at a dis-

tance by means of the "steam fog" which rises from them. Fogs are uncommon in winter, when they occur as radiation fogs, of no great thickness.

Annual March of Cloudiness in Polar Latitudes. Marine Type.

(Seven stations. Lat. 70°N.)

Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Year.
7.1	6.9	6.4	7.0	7.7	8.3	8.5	8.2	8.0	8.0	6.8	6.6	7.5

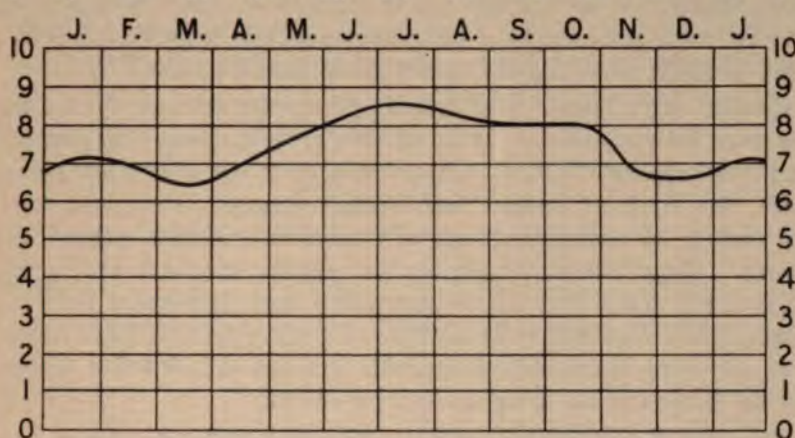


FIG. 5

Annual March of Cloudiness in Polar Latitudes. Marine Type.

The small winter cloudiness, which is reported also from the Antarctic zone, corresponds with the low absolute humidity and small precipitation. The coasts and islands bathed by the warm waters of the Gulf Stream drift usually have a higher cloudiness in winter than in summer. The place of fog is in winter taken by the fine snow crystals, which often darken the air like fog where strong winds raise the dry snow from the surfaces on which it is lying.

As yet there is little detailed information concerning the cloud forms and movements in the polar zones, and the reports are rather confusing. The records of the Nansen Expedition show a greater cloudiness by day, and with stronger winds. Cumulus forms are rare, even in summer, and it is doubtful whether the cloud occurs at all in its typical development. Clearly defined cloud forms have been reported by some observers to be very rare indeed in the Arctic, especially in the winter sky. On the other hand, Lieutenant Royds, of the *Discovery*, reports that he never saw such striking and beautiful examples of every kind of cloud as within the Antarctic circle. At Griffith Island, in the North Polar zone, two months

passed without clouds. And "day after day, with glorious clear skies and continuous sunshine" is reported by the *Discovery* in the Antarctic. Stratus is probably the commonest cloud of high latitudes, often covering the sky for days without a break. In place of well-developed cloud forms, the air is filled with fog in summer, which often grows into poorly defined stratus clouds. Cirrus cloud forms probably decrease polewards. At the South Orkneys, cirrus was observed at altitudes of 6000 to 8000 feet. Nansen's results give an average cloud movement from W.N.W. and N.W. In the Antarctic, Nordenskjöld reports cirrus from W. to W.S.W.

Cyclones and weather. The prevailing westerlies continue up into the margins of the polar zones. Many of their cyclonic storms—the weather controls of temperate latitudes—also continue on to the polar zones, giving sudden, and irregular pressure and weather changes. The inner polar areas seem to be beyond the reach of frequent and violent cyclonic disturbance. Calms are more common; the weather is quieter and fairer; precipitation is less. Most of the observations thus far obtained from the Antarctic come from this marginal zone of great cyclonic activity, violent winds, and wet, disagreeable, inhospitable weather, and therefore do not show the features of the actual south polar climate.

The most thorough study of cyclonic movements in the highest latitudes is that in connection with the Nansen Expedition in the *Fram*. During the three years of her drift, depressions passed on all sides of her, with a preponderance on the west. The direction of progression averaged nearly due east, and the hourly velocity twenty-seven to thirty-four miles, which is about that in the United States. The rainy winds were usually S. and S.E., while N.E. and N.W. were least likely to bring rain or snow. For the higher latitudes, most of the cyclones must pass by on the equatorial side of the observer, giving "backing" winds in the northern hemisphere. The main cyclonic tracks are such that the wind characteristically backs in Iceland, and still more so in Jan Mayen and on the eastern coast of Greenland these districts lying on the north and west of the path of progression. Frightful winter storms occasionally occur along the east coast of Greenland and off Spitzbergen. During the drift of the *Fram* the southerly winds were the warmest in winter and the northerly the coldest, showing that at the 82nd parallel of latitude the Siberian cold pole ceases to have much influence.

For much of the year in the polar zones the diurnal control is weak or absent. The successive spells of stormy, or of fine weather are wholly cyclonically controlled. Extraordinary records of storm and gale have

been brought back from the far south and the far north. The Swedish Antarctic Expedition, for example, under Nordenskjöld, in 1902-03, experienced for five months, beginning in May, a period of storms with short intermissions never exceeding three days, and during all of this period the average wind velocity was twenty-three miles an hour, and for a fortnight it average forty-five miles. The *Discovery* reported a gale on July 10, 1902, which lasted ten hours with a velocity of eighty-five miles an hour. Wind direction and temperature vary in relation to the position of the cyclone. During the long dreary winter night the temperature falls to very low readings. Snowstorms and gales alternate at irregular short intervals with calmer spells, of more extreme cold and clearer skies. The periods of greatest cold in winter are calm. A wind from any direction will bring a rise in temperature. This probably results from the fact that the cold is the result of local radiation, and a wind interferes with these conditions by importing higher temperatures, or by mixing upper and lower strata. During a northern polar winter the average thickness of ice formed over the oceans where no storms or strong tides interfere reaches six feet and more. Nansen found a thickness of over eight feet in one year. During the long summer days the temperature rises well above the winter mean, and under favorable conditions certain phenomena, such as the diurnal variation in wind velocity for example, give evidence of the diurnal control. But the irregular cyclonic weather changes continue, in a modified form. There is no really warm season. Snow still falls frequently. The summer is essentially only a modified winter, from the point of view of temperate zone man, especially in the Antarctic, where accounts of low temperatures, high winds, frequent fogs and much cloud, do not give a very cheerful picture of weather conditions. In summer, clear spells are relatively warm, and winds bring lower temperatures. In spite of its lack of high temperatures, the northern polar summer, near the margin of the zone, has many attractive qualities in its clean, pure, crisp, dry air free from dust and impurities; its strong involution; its slight precipitation. In certain places as on the interior fjords of Greenland and on the coasts of Asia and North America, the summer brings masses of grass and flowers, which are an extreme anomaly, and the prevalent summer fogs are a serious disadvantage.

Twilights and optical phenomena. The uncertainty and confusion of the polar night is somewhat a great deal by the day twilight due to the high degree of reflection at low temperatures. The sun usually appears and disappears some days before and after the times which are theoretically

set. Light from moon and stars, and from the aurora, also relieves the darkness. Optical phenomena of great variety, beauty and complexity are common. Solar and lunar haloes, and coronae, and mock suns and moons are often seen. Auroras seem to be less common and less brilliant in the Antarctic than in the Arctic. Sunset and sunrise colors within the polar zones are described as being extraordinarily brilliant and impressive.

Physiological effects. The north polar summer, as has been pointed out, in spite of its drawbacks, is in some respects a pleasant and healthful season. But the polar night is monotonous; depressing; repelling. Parry said that it would be difficult to conceive of two things which are more alike than two polar winters. An everlastingly uniform snow covering; rigidity; lifelessness; silence—except for the howl of the gale or the crackling of the ice. Small wonder that man feels like an intruder. Small wonder that the polar night has sometimes unbalanced men's minds. The first effects are often a strong desire for sleep, and indifference. Later effects have been sleeplessness and nervousness, tending in extreme cases to insanity; anaemia; digestive troubles. Extraordinarily low winter temperatures are easily borne if the air be dry and still. Nansen notes "not very cold" at a temperature of -22° , when the air was still. Another Arctic explorer, at -9° , says "it is too warm to skate." Zero weather seems pleasantly refreshing if clear and calm. But high relative humidity and wind—even a light breeze—give the same degree of cold a penetrating feeling of chill which may be unbearable. Thus the damper air of spring and summer usually seems much colder than the drier air of winter, although the temperatures may be the same. Large temperature ranges are endured without danger in the polar winter when the air is dry. When exposed to direct insolation the skin burns and blisters; the lips swell and crack. Thirst has been much complained of by polar explorers, and is surely due to the active evaporation from the warm body into the dry, relatively cold air. There is no doubt that polar air is singularly free from micro-organisms—a fact which is due chiefly to lack of communication with other parts of the world. Hence diseases which are common in temperate zones, "colds" among them, are rare.

NEWSPAPER LETTERS FROM THE FORBIDDEN BALKANS

By FELIX J. KOCH
Cincinnati, Ohio

III.—A PEEP AT THE ALBANIANS, THE BLOOD-DRINKERS OF EUROPE. THE MACEDONIAN QUESTION

UNLESS you are willing to drink the blood of a haughty tribal chieftain of the particular country side mapped out on your itinerary, do not visit this wildly romantic region, Albania. Wilder than Macedonia, where one is ever fearing assassination, more dangerous than southern Bulgaria, in whose defiles even my guards would never be willing to vouch that we would not be kidnapped, are the fastnesses of Albania, the home of the blood-drinkers of Europe.

On September 3, 1905, it was rumored that a serious fight had occurred in the harem, or woman's apartment, of the Yildiz Kiosk, the imperial palace at Constantinople, between the Bosniac and Albanian guards, and the rumor even went so far as to state that the occasion was made one for an Albanese to shoot at the Sultan, whose life was saved only by the coat of mail perpetually worn by Abdul Hamid, the Timorous.

Persons acquainted with conditions in the Ottoman empire to-day see the fairy tale involved in this story at once. Of all the people of the Moslem world none are half so faithful to the defender of the faith, none such ardent bigots to the word of the caliph as the Albanese, and it is told the traveler everywhere in the south of Europe that if worst come to worst Abdul Hamid could take refuge in Albania and hold out against the world. Last summer an attempt at Italian influence in Albania was the gossip of the European chancellories, but nothing came of it, and for good reason. Christian powers need no more hope to gain lasting foothold in the mountains of Albania than they might in the Cannibal Islands, and if the conquest were one of brute force it could not be lasting.

When the writer planned a tour into Albania it was to have embraced the Sea of Scutari. So far, so good. To go further, however, meant becoming involved in the most repellant custom ever met with in Europe. In the Canelesser-Tahl you have to drink hospitality with the pleasant hosts, all from one and the same tiny glass, and in Turkey one is frequently compelled to share the luncheon of some filthy Spanish Jew, but here in Albania you drink blood with your host and in this wise:

You meet on the neutral boundary line, host and you. He is in the milky-white suit of an Albanian lord, the tall white fez throwing in relief the long hair straggling at each side the brow, and the fierce fiery eyes that pierce one's soul with their luster. No pity, no sympathy, nothing but greed and fiery hate and bigotry can one read in those flashing pupils. The host takes his knife from the belt and cuts a gash in his left hand, somewhere on the back. As the blood trickles, he lets it flow into one of the small Albanian drinking cups, bought at Cattaro or in Montenegro from the traders. Then you too, must do the same, and to the mixed bloods in the cup wine from the village casks is added. He takes a gulp, you take a gulp, and you are sworn blood brothers, and you are safe anywhere in the bounds of his clan.

Time and again, from the railway trains in the Balkans, an Albanian will be seen to dart and throw his arms about some other white-clad Albanese in most affectionate greeting.

"That is my brother," he will explain, and the meaning is involved in the blood brotherhood. Unless one drink the blood he may bind the Albanian with the most solemn oath before taking him as guide, at a fabulous sum, and then once the notion enters his head he may deliberately shoot you down on some lone trail in the mountains—for if the Moslem deem the occasion good he has no hesitancy in breaking any oath made with the infidel.

Another custom laid to the door of the Albanian is that which had practice among the early Goths and Vandals, in the time when Europe was young, as regards the children. When a babe is born in Albania, it is claimed, the father exercises the right to judge if it shall live or die, and as of the selected exposure and hardship weed out the majority, there seems but little likelihood of Albania becoming over-populated.

Some forgotten wave of emigration in the centuries past marooned a little band of Albanese on the Dalmatian coast, near the city of Zara, and in the time when Volker Vanderungen were the order of the day, and the coast of the Adriatic swarmed with pirates, these folk withdrew a little ways into the interior, where their town of Erizzio is now built. Bit by bit civilization found its way down among the Dalmatian archipelagos and to Zara, where the maraschino trade has brought wealth and opulence. But the Albanese only indirectly profited by this, and as the Filipino for years had the Spaniard before him as example, so here the Albanian, profiting, however, by a milder rule, has wrought his destiny and not wholly without success.

It goes without saying that these Albanians are of the Roman Catholic sect; splendid types of manhood; tall, erect, haughty as an Iroquois, and, above all, trustworthy. They are the brethren of the Albanian, who has allied against his kin and the Turk, with the legions of Montenegro, and on whom the Sultan is reported to have called for defense against the Moslem Albanian. Along the Montenegrin border, an officer at Cetigne tells me, frays between these two sects, developing into feuds of interminable length, are the order of the day, and the very slightest error in judgment on the part of the border patrol may result in a dozen deaths.

Spotless white flannel, short trousers reaching to the knees, short cut coat open in the front and the tall fez, as with the Moslem, is the regulation attire of the Christian Albanian, save where the civilization has spoiled him. Under the open coat a shirt is seen and in bold relief against the white, the broad leather belt of bullets—not ornamental, as is the rule of the Montenegrin, but long, brass-capped missiles—ever ready to do deadly work. Couple this with the long, rounded face, the high neck and the broad chest of the Albanian, and you have a living impersonation of unknown latent strength.

Such statistics as are available make the guess—for, obviously no census of these regions has been attempted—that there are probably 120,000 of these idle, war-loving, haughty barbarians in the Albanian Balkans, and with the overflow in Montenegro and a portion of Bosnia the number is said to be about equally divided as between Mohammedan and Christian. Chiefs, whose allegiance to Constantinople is religious rather than temporal, govern, or try to control, the tribes, but from the Bocohe de Cattaro to Arta, and from the Adriatic almost to Sofia, the reign of law is unknown. Dalmatia, Montenegro, Bosnia, Servia and the geographical expression "Macedonia," even Greece, have suffered periodically from their depredations, and even Turkey, the home of the clans, has not been wholly unsullied by their crimes.

Authorities set the coast line of Albania as having a length of 280 miles, but not an acre of the 18,944 square miles of Albania proper is over 100 miles from the sea, and in all the towns on the west coast of the Nearer Levant one meets the Albanian women selling melons or the tiny egg plant and evoking the pity of the passer-by by their sad, haggard looks. Like the Indian woman at the summer resorts in Michigan or Maine, these women live largely off the stranger for what little pleasure they may obtain in life, and the home is a prison and a place of mere hardship for them. And yet, while the women do the work almost exclusively in Al-

bania, they have one liberty most unusual for Mohammedan realms, and that is that they go about unveiled and free of lace, where a Turk would slay his wife on the spot were he to find her without deepest lace-covering. If you would see these faces, worn and haggard, you may do so in safety at Cetigne; if you would see them made more beautiful by peace and plenty; it is possible at one's ease at Erizzio.

A delightful country road leads from Zara and the sea to Erizzio. On one hand is the blue Adriatic, with the white island of Uljan, and beyond the peaks from whose crests the Italian coast may be seen on the horizon. On the other, dry thistle fields stretch off to low rolling hills; there is a Champs de Mars for the Austrian troops and a hospital, and one is in Erizzio.

Donkeys are everywhere, weighed down with panniers, and \$8 will purchase the sturdiest of these animals. Goats, too, are being driven down the street by the village herder, for you are back in the middle ages here, and all the town has but one lass to tend its flock of sheep or goats. Over at the seaside are the swine, rooting among the rocks, and the little lad who tends them is in communal service, too.

This road to Erizzio and "the simple life" is the one street of the town, and little one-story homes, the most of them no larger than the summer cottages at Asbury, but all built of rock covered with a crude plaster that is painted in white or brown, flank it at either side. Doors and windows grace the front wall alone, so far as one may detect, and narrow red roofs slope gently down to throw their shadow 'cross the door. From the front and rear of the home a great stone wall, bedaubed with mud, leads off to enclose, irregularly, the garden plot—and such is Erizzio, architecturally.

One yard here, the other there; a wall touching its neighbor at a half dozen points, another not at any, but permitting of a sort of neutral strip between "my neighbor's garden." It is a hodge-podge of homes and walls that is more devious than old Boston, and more fascinating than the byways of Salem. The gardens, too, are just sufficiently neglected to be picturesque—a few olive or fig trees, a cabbage patch with some Albanian Mrs. Wiggs weeding it, corn and some dry, parched grass—that is all.

The arbor is the centre of the family life in Dalmatian Albania as in the Balkan uplands. Built out from the house, rectangular and enticing of warm summer afternoons, there is this area of shade at the door of each Albanian homestead. Here sit the family, but clad, at Erizzio, in the costume of the Zara peasant—only to be distinguished from that race, in fact, by fairer complexion and the fiery eye.

Families are large in the land of the civilized Albanian, and the father is autocrat to the day of his death. Austrian law limits the exercise of his power, legally, for a son or daughter may appeal to the courts, but this is done very rarely. Hence, by forcing the abolition of the cruel side of the patriarchal system, and yet permitting the Albanese to retain their ancient rites, the Austrians have won the sympathy of the clan leaders and the Albanese are loyal subjects of Franz Josef. Little by little, as the advantages of civilization become overwhelmingly patent to them, they are taking the custom of the Zarites for their own and the wild Albanian or Erizzio is long a thing of the past. The long musket of the youth of the race is still retained, however, but it is now over the fireplace as in Puritan New England, gathering dust through disuse.

The Albanian of Austria has learned, too, to extend hospitality and kindness to the stranger, and the clan line up for the kodak quite cheerfully at the patriarch's command. The leaders, too, take one through their little home, proudly displaying the blue dishes that stand behind the racks on the wall—as in the heart of distant Holland—let you finger the musket and admire the well-chased revolver, and then set a chair for you to take place at the round table.

He is proud of the baby, too, a wee little fellow in typical French swaddlings—for leader and clan, even to the third generation, reside in the one "long house." When, then, the householders line up at the trees by the road (a favorite place in Erizzio as it is in Indiana) for the village women to idle, the number is strikingly large. The chieftain in my photograph, Lord Bortol Kerstitch, is aged 72, and his rule is extended over a mother, aged 97, four sons and ten grandchildren, while the daughters are counted with the allied clans, into which they may have wed.

With all the attempt at taking on civilization, the Albanian, like our Indian again, cannot "out of the flesh what's bred in the bone." There is a certain air of primitive negligence evident everywhere at Erizzio. The rock stables at the roadside, joined to the homes by walls encircling the garden plot, are dirty and indicative of careless housekeeping. The goats that chance to be home from the fields ramble hither and thither at will, and the rock walls that divide the meadows, as they would in New England, are built after a plan dictated by fancy alone. Only the tall, sweet-smelling hay cocks behind the barn are trim and really orderly, their symmetry throwing into coarser relief the planless fig and mulberry groves beyond.

At Erizzio the most of the people are farmers. They own their land, and some have become almost rich, as riches go in Dalmatia, hiring other peasants from the coast cities to work their fields at as high as 32 cents a day. Roman Catholicism has taken a great hold on the place, and a pretty stone chapel is built near the sea. Close beside the church is the graveyard, and here, too, two poles, crossed crudely to form the crucifix, but bent and twisted everywhere by the cruel winds of the sea, proclaim the faith of the dead. Some of the wealthy families of late years have taken to erecting tombs, with a tablet of stone and a cross above at the head. Against these stones a large glass case, circular in form, is laid, and inside these a broad, beaded wreath, such as is common in the south of Europe, and two photographs of the deceased are placed. In an old cemetery near Cincinnati a like perpetuation of the photograph of the deceased may be found by the curious. Rows of arbor vitae leading to the surrounding wall and the sea make picturesque this ancient burial ground.

In the grog shop at Erizzio of a Sunday one may study the "refined" Albanese. On that day the men drop even Dalmatian costumery, and in conventional white shirt and ordinary trousers and vest, with the straw hat of Europe upon their heads, they sit on the upturned casks and drink the red wine of Dalmatia from the yellow earthen pitchers. Taverns over Dalmatia are dark affairs; lit, in fact, by the narrow doorway alone, and one helps himself from the faucet. Then, when one is ready to leave, the innkeeper relies on one's honesty almost exclusively for the amount drawn, and you pay at the rate of less than a nickel per liter.

After the drinking bout the men take to the road, and under a spreading mulberry tree gamble for hours at lotto, marking the numbers with pebbles off the king's highway. One card, too, will suffice for a crowd, who bet which numbers or which row of numbers on the same may chance to be covered first.

So pass hours not spent at work in the fields among the Albanese of Erizzio, and so they do in the mountains of Albania. Only there the hunt and brigandage, which is a legalized profession in that land, supplant the work in the fields by the men, and the target is more favored than the lotto. Folk are not of the choicest in these lands and one lives as best he may among them.

WILL A CRUSADE SOLVE THE MACEDONIAN QUESTION?

One of the most audacious plans for solving the eternal Macedonian question which is again with us because of rumors of another uprising is that proposed by a Greek pope whom I met on the road to this little isolated

Bulgarian hamlet on the very frontier of civilization. The scheme is nothing more or less than the preaching of a crusade against the Moslem by the Greek church in the Balkans. Absolutely preposterous as this at first seems, the more one thinks over the matter the more and more feasible does it become.

In the first place, the head of the Greek church, *per se*, in Europe, the patriarch of Constantinople, is not the tool of the Sultan in the sense in which we are commonly led to believe. On the contrary, I am told that the patriarch hates Abdul Hamid with most deadly hatred, and not without cause. When the primate will not accede directly to the wishes of his imperial majesty, Abdul Hamid has a pleasant way of locking the spiritual prince up in his palace for a week or so and making things decidedly unpleasant. Consequently, it would not make much difference to the patriarch if the good battle were fought if he only dared preach the crusade.

The question then arises, dare he? At least one half of the population of the Turkish empire is made of non-Moslems. The majority of this remainder are of the Greek church. They obviously would fall in line and adopt the cross in the battle. Next in point of numbers, or possibly even more numerous than the Greeks, are the Bulgarians. Remember this does not in any sense mean citizens of Bulgaria but members of the Bulgar church. Almost the only difference between them and the Greeks is the fact that the former owe allegiance to the exarch at Sofia instead of to Constantinople, and that there are a few tiny outer differences in clerical matters. As these people are blood brothers of the Macedonians and as they would undoubtedly find here the long desired goal, they would certainly forget little differences of creed for the time being and join in the holy war.

Ask any Spanish Jew of the Ottoman empire what he has suffered from the Turks and you will be convinced that these people would lend their financial and spiritual, if not active and open, support to the cause.

And so on with the other polyglot that exists in Macedonia.

Now as to surrounding nations.

Russia finds in the overthrow of Turkey the long coveted opportunity to advance to the Golden Horn, especially as the czar, as protector of the Greek church in the east would find himself guilty of inconsistency if he dared so to do. Bulgaria is of the Bulgar church. Servia, with its Serb church, is a daughter of the metropolitan, and such of the Roumanian peasants as do not belong to the Roman Catholic church are also in the

eastern fold. Hence from all these lands, palmers might be drawn for the expulsion of the hated Turk from Europe.

Would the people come?

Any one who has been in the Balkans knows that they would. I venture to say that were one of the black robed popes so common over the peninsula to stand in his pulpit some Sabbath morning and then and there exhort his congregation to take up the good cause, before nightfall every man and every boy able to bear a musket would be enrolled.

We in America have no conception of priest power as it exists in the Balkans. The village curate is to the people infallible. The "papa," the father, is more than spiritual minister to them, he is the guide and guardian in every walk of life.

Out on the porticoes of the churches are painted grim scenes of tortures in the life beyond.

I recall particularly one cycle of these in a little church here in Bulgaria where the men and women and children are buried in pits much resembling the tops of the coke ovens of Pennsylvania, with their heads just emerging from the "cover," while smoke and flame dart out on every side. Over the top of this supposedly red-hot pit a giant 'gator is sauntering, and now and then as he is especially attracted by some luscious mortal, he complacently bites off its head as does the crocodile in the "Punch and Judy" shows of our fair rings to one or other of the heroes of the pantomime.

In other pictures legions of devils with diabolical grins are seizing the condemned by the nose, with pincers or without, and there are a hundred similar methods of torture to be studied if one so desires.

To the people these images are not symbolical; they are facts and the "little papa" as he is called, it is felt can inflict such pain hereafter upon all.

As the village priest walks down the street, folk come up to kiss his hand or invoke his blessing; every one stands in awe of him, his word is beyond dispute.

Should this man give the promise of remission of all sins of the past to those engaging in crusades, as was done in the days of Coeur de Lion, it is safe to say every one would go forth, as did even the children of Europe in the early thirteenth century.

And what could such a legion accomplish?

Certainly much!

Engulfed by these folk at home, forced to resist the legions from abroad, Abdul Hamid would probably be forced at last to raise the green flag.

That is if the Sheik ul Islam, the head of the church, permitted.

Intelligent Turks, in answer to my query why this banner has not been raised long ago, hint that the green flag of the prophet, at whose call every Moslem in the world must come to the relief of the caliph, can only be raised when there seems chance of success in the combat. This chance Abdul Hamid would hardly have.

In fact, the probabilities are that instead of aiding him, the Sheik ul Islam, who is really master of the Sultan, since he can proclaim the monarch an unfit head of the church, would simply exhort the people not to obey, and then declare the throne and divan vacant.

Abdul Hamid is too easy going to bring on such an issue.

Many say he is not aware of what is going on in his empire and that such a revolution would come as an entire surprise to him. The charge however is false. Even were the Sultan's system of espionage not as complete as it is, the ambassadors who meet the defender of the faith in direct audience have time and again informed him of the state of affairs.

The truth is, he doesn't care.

"Apres moi deluge" is the motto to-day in Turkey.

As to keeping the throne for his heirs he seems not really bothered over that. In fact nine Turks out of ten do not know just who the next Sultan will be. The heir apparent is always the oldest male relation of the Sultan, and not necessarily the oldest son, and it is told that more than once the prince apparent has been very nearly poisoned at the instigation of his royal father to keep him from plotting.

Misrule in Turkey is not confined to Macedonia. It is ubiquitous. Then why attempt a reform?

The system as it is, is completely satisfactory to the Sultan.

The valis, or province governors, buy up the districts at so much a year. If the money isn't sent they receive the bow string. How these obtain it he doesn't care. If they oppress the Christian subjects it doesn't greatly matter. If they oppress the Moslems they will have to send him additional presents to square matters or he will quietly sell their position to some other office seeker and either put them out of the way or degrade them.

Everybody is living off graft and everybody expects to be bled. So the people arrange their affairs in accordance, and nobody is much the worse for it. Nobody, that is, except the infidels, and they, of course, are not to be considered.

And now the worm is turning in Macedonia. In the spring time there is to be a renewal of hostilities. If then the holy war is proclaimed all

the world will look on with interest; a crusade in the twentieth century to rescue not the Holy Land, but to make the Moslem relinquish the battle ground of cross and crescent of two centuries and more—there is a fund of suggestions for the romancer in this idea.

Who will lead it?

Possibly from some upland village will come another humble pope, another Father Gapon, at the head of his people.

In the little hermitages that abound in southern Bulgaria the anchorites have their secrets.

Even in the great monasteries, such as Rila, where a thousand refugees are taken in each winter and fed and housed until the snows melt on the Macedonian side of the border, there are arsenals.

And no war is so terrible as a war for the faith. If it comes the land will be drenched with blood.

But only such a bath of gore seems the final solution of the Macedonian question. The reforms of to-day have failed and the Christians are up in arms.

A METHOD OF MAKING A TOPOGRAPHIC MAP

By F. V. EMERSON
Columbia, Mo.

A MAP is a kind of written language by which an immense amount of information may be conveyed in a brief space and, like any other language, maps must be thoroughly understood before their facts can be well appreciated. Owing to our training which begins in



FIG. 1

Topography from County Caernarvon in North Western Wales; Bangor sheet No. 106, ordinance survey of England and Wales. Scale 1 inch=1 mile. Both hachures and contours are used, the contour interval being 250 feet.

the lower school grades, most of us read the ordinary location maps with ease. We get a more or less accurate idea of the two principal things that they show, namely, distance and direction.

For a complete picture of a region, the third dimension must be shown. One must know the hills and valleys, the highlands and lowlands and their various forms and dimensions, or, in another word, the *relief* of a region. The maps that show relief are of two general classes, hachure maps and

contour maps. The maps of most European countries are of the first class, Fig. 1. They are easy to read and give a vivid impression of the surface. They are really generalized drawings. The disadvantage of the hachure map is that it is of necessity inaccurate. Even the most careful shading will fail to bring out the details of elevation that can be shown on contour maps, and, when the relief is of great variety, the shading obscures the place names and makes close reading somewhat difficult. But, for the general reader, the hachure map gives a general view of relief without much mental effort.

The maps of the United States Geological Survey, in which it is proposed eventually to present the entire United States, are of the contour variety. Relief is represented by lines that are drawn through places having the same altitude. The function of a contour line may be illustrated by supposing the sea to rise to an altitude of say six hundred feet. Then the six hundred-foot line would be coincident with the shore line. The advantage of this method is the possibility of extreme accuracy. By careful work, the exact altitude of any place can be shown. In general, the contours do not obscure the printing and other features of the map. It should be said that owing to the large areas covered, the average topographic map of the Survey is not so accurate as it seems to be. The great disadvantage of this map is the difficulty that the average person has in reading it. Its symbols are purely conventional and do not appeal to the eye as do the hachure maps. It takes considerable time to learn the alphabet of these maps, and generally a longer time so to master them that one does not need to spell out their meaning.

The ability to interpret contour maps may be gained by studying the maps themselves, by comparing the maps with the surface mapped, or by mapping a given surface. All these methods are useful, but the last is perhaps least used. The writer's experience in summer school work goes to show that time spent in actual mapping of some surface is profitable and is one of the quickest and most satisfactory methods of learning the contour map language.

While it is true that rapid, accurate contour mapping requires trained men, almost anyone can by care make an accurate contour map. The method to be explained may perhaps be best presented by glancing at the methods of a professional topographer. All field mapping is done on a "plane table." This is simply a flat top set on tripod so that it can be turned in any direction. In one side of the table a compass needle is sunk, so that the table may be set in a north south direction. The paper on which the

map is to be drawn is fastened to the table. The north part of the map can then be placed at the top of the sheet according to the usual convention.

A base line is measured, say 100 feet long. The measuring is done as carefully as possible, because a good many determinations will be taken from this line without direct measurement. The base line is represented

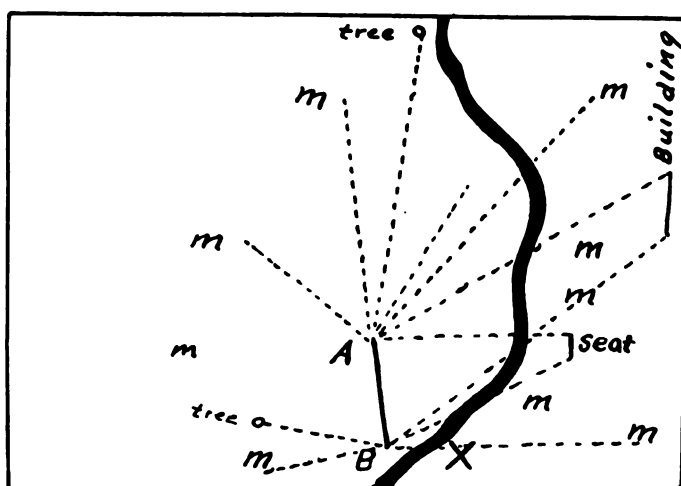


FIG. 2

Sketch showing locations. The building and seat in the eastern half of the map were located by intersection; the other points were located by traverses.

on the map by a line say 10 centimeters long. At each end of the base line observations are taken on various objects, and their angles with the base line are found. These angles are then plotted on the map and the relative positions of the various objects are determined. For example, if A, B, Fig. 2, represents the base line, by plotting angles at A and B and continuing their sides until they intersect, the position of the rustic seat can be determined. This is the method of intersection. By continuing the process a large number of places can be located often from one base line.

If for any reason the intersection method is not used, the traverse method can be employed. Suppose the point M is to be determined. Its direction from A or B is found and its distance is measured. It is then plotted on the map according to the scale in use.

The contours are drawn somewhat as follows: Suppose a point X is on a hill top. The topographer finds the altitude by the aneroid barometer or by measurement from a point whose altitude is known. He has

also determined the altitude of various other points. But he does most of the work by sketching in the contours. This sketching requires skill and a knack for the work. The accuracy of the sketching of course varies with the topographer. The above description is not an exact account, but



FIG. 3

The standing figure shows the method of taking levels; the other figure shows the method of getting the direction upon the map of different points.

it includes the fundamental operations and may make clearer the special method to be described.

The method used for class work is a rough imitation of that of the topographer. In order to give practice in expression, a portion of a campus was chosen which combines steep and gentle slopes. A sketch of the region that was mapped is shown in Fig. 4. The first thing to be decided was the scale and the contour interval. The dimensions of the

map were 6 by 5 inches and that of the area to be mapped, about 200 by 100 feet. The scale was fixed at 30 feet, or twelve paces to the inch, this being a convenient unit for the size of the map. The difference in height between the highest and lowest points is about 20 feet; the contour interval was taken at five feet, or, for convenience, the distance from the eye to the ground.



FIG. 4

A sketch of the area mapped.

The plane table was not used. The idea was to employ as simple apparatus as possible, both because such apparatus is easy to obtain and because the principle is much more easily grasped when simple apparatus is used. A drawing pad was placed on the ground and by means of a hand compass was oriented (Fig. 3), the top of the map being placed to the north. The base line A, B, Fig. 2, was drawn along a straight level path and was made thirty feet in length. This length was chosen because the level part of the path was about that long; it was represented on the map

by a line one inch long. Its direction was obtained by placing a ruler on the map and sighting to get the ruler in the direction of the path.

Having determined the base line and its representation on the map, the location of trees and other objects was an imitation of the topographer's traverse methods. The reading of angles, of course, was not attempted, and the intersection method was but little followed. To locate a tree, for example, one would pace from one end of the base line and determine its distance. Its direction of, say, northeast 10 degrees, could be found by the compass and the line plotted on the map, but with a small area there

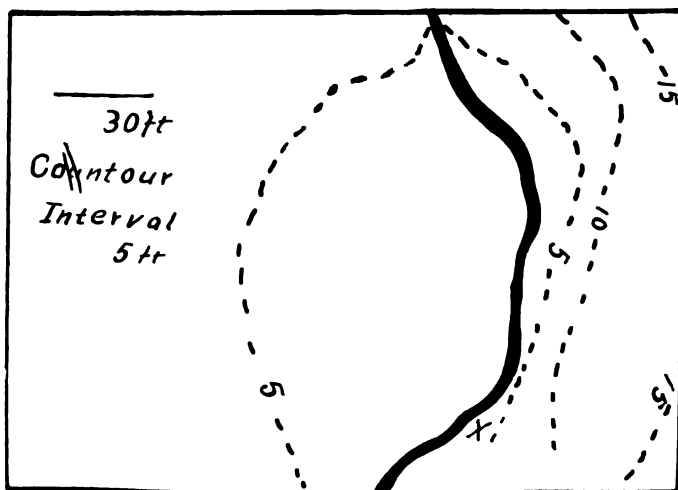


FIG. 5

A contour map of area sketched in Fig. 4.

was little error in sighting to the tree along the ruler on the map and assuming that the line along the ruler would coincide with a line determined by the compass, Fig. 3. For large objects it was found sufficiently accurate to take a protractor to one end of the base line, repeat the process at the other end, and then find the position of the object on the map by the intersection method. Fig. 2 shows the map on which intersections were made.

Having located a few points the contouring can be taken up. For simplicity the lowest part of the region is taken as zero; it is generally found in the water channel. The lowest spot shown on the map is marked X, Figs. 2 and 5 and from this point altitudes were measured. Standing at point X, obviously all points on a level with the eye would belong in

the first five foot contour line. The problem is to find the points in such a plane. Unless one has tried the experiment, it is difficult to realize how easy it is to under or over estimate altitudes. There are many ways in which this can be done with accuracy. For instance, if one should take a carpenter's level and holding it horizontal, look along it, all objects seen in the plane of the level would be in the same plane as the eye. This is the principle of the Locke level which is used for this purpose and which is more convenient.

However following the plan of using simple instruments, we employed a crude but simple method. If one looks across the level top of water in a glass tumbler, obviously it serves the purpose of the Locke level. The level may be ascertained since the water's edges on both sides of the glass are in the same plane. The chemist's "U" tubes serve the purpose well. The standing figure in Fig. 3, illustrates the method.

It is well for one person to act as "marker" by placing paper, stakes, etc., to mark the levels. Where the slope is small these may be some distance apart but where the slope is steep or the surface broken, the markers should be closer. If desirable, some of the markers can be located on the map, e. g., m-m Fig. 2, to guide in sketching. When a good idea of the location of the first contour is gained, the contour should be sketched upon the map. After the first contour is drawn, the process can be repeated by taking a point ten feet above the zero point, or five feet above the first contour, and repeating the process. The same procedure can, of course, be repeated for any contour.

In practice the two operations of locating objects and getting data for altitudes can be combined, especially after the first contour is drawn. They have been described separately for the sake of clearness. The work should be watched especially where the contours cross a valley for this seems to be a stumbling block in reading and drawing maps. The widening of the space between contours in gentle slopes and its narrowing on steep slopes were especially valuable in giving an almost unconscious facility in understanding a map. The completed map looked something as in Figure 5.

After the field map was completed and corrected, a day was spent in map sketching. Some of the problems were: draw a deep valley with a steep slope; with gradual slope; a valley with a slope of 10 feet per mile. Draw a hill 50 feet high, contour interval 10 feet; draw the same with a valley on the N. W. side, 20 feet deep at the mouth; a hill with a slope of 10 feet to the mile on the east side and 20 feet on the west side. Place a smaller hill 20 feet high on the east side.

TRAINING IN GEOGRAPHY¹

By F. P. GULLIVER
Norwich, Conn.

GEOGRAPHY has been taught for many years as an informational subject. Masses of facts are given, many of them undigested, and often these facts have no systematic relation to each other as they are given to the pupils to remember. Memory is made an all-important factor by this method of teaching the subject, and it is an undoubted fact that the memorizing of a mass of disconnected material is one of the most difficult accomplishments for the human mind, and one which is practically useless from an educational point of view. Most of the facts so learned are retained in the mind but a short time and are easily forgotten. This leads to the method of cramming for examination, which is always to be deplored.

Systematic training in the science of geography has demanded a good deal of attention during the past few years, and it is to this subject that attention is called in the following paper. The history of the development of systematic geography from the early work of Ritter and von Humboldt will not be discussed, but assuming the fact that geography may now be considered a distinct branch of science, some of the more recent methods of teaching this important subject will be described and discussed as a valuable means of training the minds of pupils.

No one will doubt that every educated man should know a certain number of the important facts in regard to the geography of the world in which he lives, and of which he is a part. The relation of man to his surroundings is too important a subject to be lightly passed over in this age of great commercial enterprise. The boys of to-day will have to be the leaders of the world to-morrow. No one can successfully cope with the world problems of trade and commerce unless he has some knowledge of the various portions of the world in which he is to become an important factor.

The difficulty lies in knowing just how to obtain this knowledge of the great world outside of one's own little sphere of activity. The ideal way of course would be to travel to all parts of the world, and see as minutely as one can the surroundings of other people in other climes, but of course this is possible for only a very few of us. The time necessary to obtain even a fairly accurate knowledge of the one hundred square miles im-

¹ Reprinted from *Elementary School Teacher*.

mediately surrounding one's home makes it absolutely prohibitive to study the geography of the world by this ideal method. It is astonishing to find how few people have any adequate conception of even twenty-five square miles of territory immediately surrounding their home.

The method used therefore in systematic geography must be such that with a minimum amount of actual travel, rational and intelligent ideas may be obtained of parts of the world which cannot be visited in person. Books of travel well written have always been interesting to boys, and it is undoubtedly true that a great deal of information in regard to other parts of the world comes from such books of travel. The writer firmly believes that many more such books of travel written particularly for young readers will be of the greatest value as aids in the teaching of geography. This, however, is work which should be done outside of the class as illustrative of class work rather than as the basis of systematic geography. The short stories written for children, such as have appeared in the last few years in the *St. Nicholas*, *Youths' Companion*, and other well written papers for children, stimulate in the very young the thirst for more knowledge in regard to distant regions. These truthful stories of differing conditions have very wisely taken the place of the fantastic tales which used to be told in regard to monsters, goblins, and extinct animals. What is wanted is actual knowledge of the present conditions in the world in which the boy is to live.

There is very wide acceptance of the idea that the point to begin the teaching of geography is the home and its surroundings, the school, the school yard, and the village, city, town, and county in which the pupils reside. Home geography, then, should undoubtedly be the starting-point for systematic training in geography. The great difficulty in the carrying out of this idea is the fact that no text-book is available for every school. In fact no publisher would consider the idea of making a separate text-book for each town. In a few of the great centers of population this has been attempted; and as far as the results of only a few years of application of this method warrant an opinion, it is undoubtedly true that this method has met with very great success.

A greater difficulty than the text-book is the teacher. Very few teachers are properly prepared to instruct their pupils in regard to home surroundings. The teachers themselves do not know the home in which they live; this is a strange fact, but very true. A good teacher in sympathy with the surroundings of the home and school can develop a great deal of interest among the pupils in home geography. Teachers are too often afraid

to rely entirely on themselves, and hesitate to start out as explorers with the class in the immediate vicinity of the school.

Principals and superintendents also are not alive to the real situation in this matter. They know that the teacher is untrained, and they fear the criticism of parents that "time is wasted when not spent looking at a book." The fact, however, remains that time is not wasted by out-of-door work, even if imperfectly done. It is far better to get a fair knowledge of one's surroundings on this earth than to have no knowledge whatever of one's surroundings. Observational knowledge remains in the mind much more tenaciously than facts learned from a book, and if the facts learned about the home are so learned that they lead the mind out into the greater affairs of the state, the country, and the world, it will be of infinitely greater value to the pupils individually, as well as to the state, the country, and the world in which these pupils live.

By a study of any industry located at home a knowledge of that industry, as carried on in other parts of the world, may be rationally and easily obtained. This study of some special branch of agriculture or manufacture leads to the wider study of commerce. The commercial relations of the world depend on the facts of home geography in a great number of points. It is along these lines of commercial enterprise that the life blood of the world flows. Until some reasonably accurate idea is obtained of the industries immediately surrounding one's home, it is practically impossible to give pupils any adequate conception of the great world industries, of which his home industry is simply one small part.

Geography deals with many of the complex interrelations between man and the plants and animals which surround him. It is therefore important that he should study first the plants and animals surrounding him before he can understand the great trade of the world in cotton and leather. A fairly accurate knowledge of the growth of the plants which surround him will enable the boy to form some rational conception of the growth of other plants in other parts of the world, which have an important relation to the life of man on the earth. A study of the habits and characteristics of the animals in any region will in a similar way enable the boy to conceive in a fairly accurate way the great facts in regard to many animals in different parts of the world, upon whose existence and development man so largely depends.

It may be safely said therefore that systematic training in geography should begin with the home surroundings; and that a knowledge of the relative location of the home to the school, the school to the village, the

village to the city, the railroad connections of county and state leads to the state capital, to the state metropolis, and should lead later to a knowledge of the other states, and finally to the other countries of the world. The next step should be a study of the plants and animals surrounding the school in order that the pupils may have a clear understanding of the great facts of animal and plant life which so closely affect the position of man on this globe.

No one will be bold enough to say that every school should take up systematic geography in exactly the same way. So much depends upon the locality, and so much on the individuality of the teacher, and upon the interest of both teacher and pupils, that the best scheme for each individual school must necessarily differ from the best scheme for other schools. There are however many important principles which should be studied in every school, and a text-book based on these general principles, written so as to stimulate observation rather than memory may be so constructed that it will be of service for schools in very widely differing localities. It must emphasize those facts of local geography which are characteristic of the greatest number of regions. These exercises must of course be supplemented in each individual locality by the facts which appeal most to the interests of the pupils and teacher.

Such a book should contain exercises based on the common animals and plants which occur in the greatest number of localities. When an exercise cannot be used in a given locality another more suited to that individual school should be substituted in its place. Thus after a few years of work in any given locality a teacher will find those subjects which best stimulate the observational faculty of each pupil. The text-book will not be used as a cast-iron structure from which no deviation can be made, but will become an elastic structure which will simply guide the minds of teacher and pupils into the lines of thought best calculated to give the pupils such an idea of the immediate surroundings, that they may then safely extend their conceptions to more distant regions.

For example, the study of meridians, that difficult stumbling block for so many pupils, should begin with the idea of the shadows at noon of various objects. These shadows form the mid-day line for the school. Let this idea of a mid-day line be extended until its significance is perfectly clear. At 12 o'clock the shadow of a pole forms the mid-day line for the school. Extend this mid-day line both north and south. When this conception is perfectly clear introduce the idea that by following this mid-day line north and south the north pole and the south pole will be reached. Then state the fact that this is the meridian line of the school.

By the use of a small globe it will then be very easy to pass to the idea of the meridians of other places, and the false idea often obtained that meridians are only imaginary lines, drawn at stated intervals, east and west from Greenwich, will never enter the minds of the pupils. Mid-day lines are everywhere. Meridians in the same way pass through all points on the face of the earth. Their real character is thus firmly established in the minds of the pupils, and the mathematical fact that lines may be imagined between any two points does not enter into the conception at all. An actual meridian line should be drawn on the school room floor or in the school yard, from which pupils may take their first conception of a map.

Map drawing and map construction should be among the earliest ideas introduced to pupils. Before maps of the county, state, country, and world are introduced, pupils should know from actual experience what a map is. Make a map first of what may be seen, the school room, the school yard, or the village. Let this map be constructed on different scales, so that pupils may realize what the change of scale means, the representation on a small area of a larger area. One of the commonest sources of misconception in geography is the lack of appreciation of what a map really represents.

When pupils thoroughly understand the meridian and the school map, the idea of representing a larger area should be introduced. This may be called a *route map*. The class should cover an area so large that it cannot all be seen from one point. A compass may be used to give direction; pacing, revolutions of a wheel, or time taken on a trolley trip may be used for distance. The route followed on the trip should then be represented on different scales. More than one such route map will have to be made before all the class get a correct idea of what a map really means.

When the making of such a route map is impracticable a very good substitute is to take the courses followed by different pupils from their homes in different parts of the town to the school. When each one has made a map of his daily walk to and from school, these lines may be put together on the blackboard by the teacher or pupils, and the map of the village is thus easily obtained. The school in this map may be represented by a dot, while in the first map constructed it is represented by four lines surrounding the space which represents the interior of the school building. Only after these conceptions are fully fixed in the minds of the pupils is it safe to introduce a map which represents the village as a dot, with roads and railroads connecting surrounding towns, also represented by dots.

Along with the development of the idea of local geography a knowledge of what a village contains should be obtained by the pupils. The writer firmly believes that it is the wisest plan to introduce with this study of locational geography a knowledge of what makes up a town, its people, business, manufactures, its railroads, its steamship lines, as well as the plants and animals which inhabit the region.

Geography truly includes the elements of various sciences. If the elements of the various branches of science are introduced at this early period as a part of the teaching of geography, the pupils gain a better conception of what geography really is, and at the same time get a conception of what the other sciences treat. If the facts thus taught are wisely selected geography will not become a mass of disconnected facts, but will be a natural foundation for scientific training, and a stepping stone to the later study of the details of these other sciences.

EDITORIAL

IN RETROSPECT

THIS number of the JOURNAL OF GEOGRAPHY completes the tenth consecutive volume of an American Periodical devoted to the educational aspects of geography, and especially to school geography. The venture was inaugurated in January, 1897, by the present Editor, as the Journal of School Geography, and was continued for five years under that title. In 1902 the Journal of School Geography was combined with the *Bulletin of the American Bureau of Geography*, which had been for two years most successfully conducted by Professor Edward M. Lehnerts of Winona, Minn., and has since appeared under the present title. The change in title meant no change in scope or character, for it has always been the aim of the present editor and his colleagues to make the paper distinctly an educational paper. There have been for years strong scientific and popular geographic periodicals but these papers have given in the past and now give but little attention to the educational aspects of geography. That the venture was not ill timed has been proved by ten years of continuous growth and by the increase of favor with which the JOURNAL has been received. The publication of the JOURNAL has been "a labor of love" on the part of the several editors and publishers who have worked for its success. The JOURNAL has not met its expenses by a wide margin any year, and is still conducted at a large pecuniary loss by the present

Editor. The work has been carried on in spite of difficulties because the demand for the continuance of the JOURNAL was too great to be unheeded, as has been evidenced to the Editors very strongly in many ways. The continuance of the JOURNAL has been largely due to the contributions of friends of the cause who have helped frequently to meet expenses.

Ten years ago School Geography was just emerging from the darkness. The famous report of the Committee of Ten had aroused the leaders and the alive members of the ranks, and Frye's geographies had shown that there was a new and an interesting way of approaching the subject. During the ten years since school geography has been very much under discussion and vast strides forward have been made. New books, new methods, wider interest, more intelligent teaching, more rational use of maps, illustrations and supplementary work have largely taken the place of the old time memoriter work known in the years after the inspiration of Guyot had died out more or less and before the revolution inaugurated largely through the books of Mr. Frye. Now the discussion has waned a little, the leaders are more or less in accord as to ways, means and ends, and the promise of the future is bright. Geography in schools is destined to become even more rational and strong as the teachers continue to grow better and better able to interpret and apply the ideas of the leaders.

The growth, development and interest in the Secondary school, Normal and College fields have been no less important or keen. Laboratory work has come to stay in both secondary schools and colleges and it is now not the exceptional high school that teaches modern physiography; the leading colleges all have their departments devoted to geography or some phases thereof, and normal schools teach geography as a basis for methods of teaching.

The various stages of progress in this development all along the line have been chronicled in the JOURNAL and its predecessors noted above. A study of the files of these papers would form the basis for an interesting history of the growth of modern ideas and practices in this one phase of education. Not the least important of the advances has been the wider, saner and more human, not to say humane, interpretation given to the term geography by leaders and followers. Geography is no longer considered a synonym for physiography; it is viewed as a subject full of life as well as earth, and it is recognized that good pedagogy demands the teaching of geography in its broadest sense in schools.

The inspiration that has caused this growth and development all along the line has come largely from the leaders in the colleges who helped

organize and make available the results of scientific geography. Chief among these leaders is Professor Davis of Harvard University: who has taught a large number and been a constant inspiration to all teachers of geography in colleges, secondary schools, and normal schools. Professor Tarr of Cornell University, by his books and writings, is a close second among the earlier workers at the task of bettering educational geography. The names of the men and women whose good work is now known wherever modern geography is taught are too numerous to mention here. All have worked with enthusiasm, vigor and unremitting zeal in a cause that has proven large enough for a continuously increasing army of co-laborers. The names of Salisbury, Brigham, Goode, Gilbert, Frye, McMurry, King, Ward, Semple, Jefferson, Redway, Lehnerts, Clifford, Fenneman and Johnson are perhaps the best known and deserve the deepest thanks for their contributions to the cause.

More than a beginning has been made in the ten years which have elapsed since the inauguration of the *Journal of School Geography*. To this growth the JOURNAL has contributed what it could. It has chronicled events and new items as fully as possible, it has reviewed books frankly and impartially, it has published more papers on the teaching of geography than have appeared in any combination of sources known to the editor, it has done its best. The Editor appreciates keenly the shortcomings of the JOURNAL but he knows, as do few others, the difficulties with which the JOURNAL has been confronted, and recognizes that there have often been valid excuses for the deficiencies of the paper. What has been accomplished has been due to the constant help and encouragement of a few workers. Especially are thanks due to Professors Davis, Goode and Lehnerts, who have contributed so much to the success of the paper in many ways. A much increased subscription list is all that is now needed to make the JOURNAL enter upon its second decade with promise of increasing usefulness and strength. Friends of the JOURNAL can aid the cause of educational geography by helping in this work, and their assistance in this, as in all ways, will be more than welcomed by the Editor and his co-laborers.

RECENT PUBLICATIONS

THE PRELIMINARY GEOGRAPHY, being volume I of the Oxford Geographies, by A. J. Herbertson, pp. viii and 149, Oxford. The Clarendon Press, 1906.

The Preliminary Geography is the first in the series of geographies by Dr. Herbertson, of which Vol. II, the Junior Geography, has already been reviewed in these columns. Planned practically as a beginners' book in regional geography, the volume contains a well-presented summary of the general and more important special features of world geography. Illustrated by numerous black and white maps and diagrams. These are the most unsatisfactory features of an otherwise pleasing book. Many are without scale. Most have no latitude or longitude lines and several are so reduced as to be almost unintelligible. Parts of the book would make excellent supplementary reading in elementary schools.

SYMPOSIUM ON GENERAL GEOGRAPHY. The Educational Bi-Monthly, Vol. I, No. 2, pp. 106-148. Chicago Normal School, December, 1906.

Contains articles on the Organization of the Subject of General Geography, by Frank W. Darling; the Physical Factor, by W. M. Davis; the Commercial Factor, by G. C. Chisholm, J. Paul Goode, Spencer Trotter; the Social Factor, by F. M. McMurry, A. J. Herbertson; the Political Factor by Richard E. Dodge, J. W. Redway; Geography in American Universities, by Jane Perry Cooke.

A valuable series of articles that deserve reading by all interested in school geography, and especially by teachers in elementary schools.

NOTES

NATURE NAMES IN AMERICA.—The early colonists, Puritan and Cavalier alike, were in the main English yeomen. They came not from the crowded centers, but from the rural districts, and it matters little from what district they came, all had been in touch with nature in England, and planted deep in their hearts was the love of fields and woods. This was not often expressed—it was too deep-seated a sentiment; but we see its workings in many an old chronicle. It was not what in the modern sense might be termed poetic, though there were undoubted poets among them. It was rather the feeling that an unlettered countryman has—a certain inexpressible love for the soil and the things thereof. The English emigrant to America was too much a part of his surroundings to see nature from the poet's point of view. The modern esthetic cult—the love of the beautiful—was not a portion of his mental equipment. He had the inquisitive and acquisitive qualities of mind, the interest in things for the sake of knowing about them, the attitude of the curious, and above all, an interest in the practical uses of natural products. With this attitude of mind toward nature he set foot upon the shores of the new world. The surroundings that he had left are best pictured in the rural

England of Shakespeare's and of Milton's time. The richly green meadow pastures watered by abundant streams, along the banks of which Walton and his brother anglers loved to loiter in the shade of broad-spreading trees; the rolling uplands and lines of low hills; the deeply ploughed fields and scattered masses of woodland, with here and there a church spire peeping above them; the hedge-rows blossoming with wild flowers and haunted by innumerable song birds; ancient, ivy-mantled towers and drowsy hamlets, with noisy flocks of rooks and daws—these were the elements in a landscape enveloped in the soft atmosphere of an English sky, and with all the endeared associations of home, that the emigrant carried in his mind and heart to America. Little wonder that he sought in his new surroundings for something to remind him of this old home. The forbidding, untrodden wilderness hemmed him in on every side. The Puritan found a rugged land and a harsh climate; the Cavalier, a more generous display of nature; but each had to wrest wide areas from the wilderness before the landscape could become in any sense domestic. As this domestication of the land went on, the colonists found birds coming about their dwellings, building nests in their gardens and in the shelter of their barns, and they began taking note of many of the wild plants that grew in their neighborhood. By the time some of the earlier accounts were written, the settlers had already made the acquaintance of a number of the more familiar kinds and had given them names. It was the England of Elizabeth that was transplanted in New England and Virginia, and a considerable body of old world folk-lore was a part of this transplanting, much of which has come down to us in the names of plants and in the various other forms of speech. Garden-craft and the 'art of simpling' was a part of every housewife's knowledge, and plants were diligently sought for their healing virtues. Knowledge of this kind was also to some extent gained from the Indian inhabitants. In all the earlier descriptions of the new world such objects had a prominent place, together with the character of the land and aboriginal peoples and the advantages for settlement. One can see in these accounts the evident striving of the European mind to find suitable names and to describe an object by its likeness to familiar objects at home.

The few records that we have of the impressions of the earlier colonists are scattered through old journals, letters and histories of travel, and the references to plants and animals are often exceedingly obscure as to the species indicated. The question of the origin of names is at best recondite. Names are part of the folk-lore of peoples; they came into existence far back in a dim past, long before the period of written history. When

we do find them gathered in ancient vocabularies, as in the one of Aelfric (955-1020 A.D.), we may be sure that they were even then venerable with age. The new world has added comparatively little to the stock of old world nomenclature. More often an old name has been given to an entirely different thing from the one that it originally stood for, and has been twisted into a new meaning with new associations. Thus the word *creek* originally meant the tidal estuary of a small river, a place where vessels might find harbor, and it so used throughout Great Britain to-day. In certain parts of the United States, notably along the middle and southern Atlantic seaboard, the word has been extended to the small tributary of a river throughout its entire course. In England these little inland streams are called 'brooks,' which is clearly their rightful name—shallow watercourses with much tumbling and bickering over stony places. Milton very clearly distinguishes between the two where in 'Paradise Regained'

Freshet or purling *brook*,

many be contrasted with the lines in 'Paradise Lost'

Forthwith the sounds and seas, each *creek* and bay,

Both are here pictured with their characteristic associations, the one as an upland stream, the other as a tidal inlet. In the Bible the word 'creek' is used with perfect clearness as to its meaning in the description of Paul's shipwreck—"And when it was day, they knew not the land: but they discovered a certain *creek* with a shore, into which they were minded, if it were possible, to thrust in the ship." Here we have the idea of a harbor in the use of the word. It is possible, I think, to see how our brooks have come to be called 'creeks' when we reflect that south of New England the large rivers have many smaller streams emptying into their tidal waters. The mouths of these are often deep enough to make a shelter for vessels, and they were undoubtedly so used by the early settlers. Hence the term 'creek' and its extension to the entire stream and to other similar streams far inland throughout a wide extent of country.

In portions of the middle Atlantic region the word 'cripple' was formerly used for dense, low-lying thickets, especially in wet ground. As a boy I occasionally heard it applied in this way, and it is quoted by Murray as occurring in the Penn-Logan Correspondence (1705). None of the dictionaries, however, attempt to trace it back to any dialectic source, nor is it given, with like meaning, in the vocabularies of provincial English. In the dialect of east England 'creeple' means to compress or

squeeze, which might suggest the notion of a thicket. But words were not coined by the early settlers through mere suggestion; they had an ample supply for every-day use. This word 'cripple,' from its very local character, is undoubtedly a corruption of the Dutch word 'Kreupelbosch,' signifying 'underwood,' the Anglicized form having been shortened by dropping the terminal 'bosch,' which means a wood or forest, and is allied to our now obsolete words, bosky and boscage. 'Kreupel' is an adjective meaning lame and suggests a creeping or halting mode of progression as in the common use of the English word. One who toils painfully through thickets with much inward, if not outward, cursings will appreciate this most expressive word borrowed by our English settlers from their Dutch neighbors on the Hudson.

Swamp is more generally used in the United States than in England. It does not occur in the writings of either Shakespeare or Milton, though some of the minor poets make use of it and it is frequently found in the early descriptions of the colonies. The word implies wet, boggy ground in woods, with rank undergrowth, and is eminently characteristic of the wilder conditions of this country as compared with the more highly cultivated lands of Europe. The settlers, in this instance, had a keen sense of the fitness of the name. They early distinguished the treeless stretches of salt grass along the seacoast and river estuaries by the word *marsh*. *Fen* rarely if ever finds its way into American speech and writings, except when used in a poetical sense, as in Longfellow's 'fens of the Dismal Swamp.' *Swale* appears to have two meanings, a shady spot and a low rise of land. In provincial dialects it means both a vale and a shady place and in Northamptonshire 'a gentle rising in the ground.' In the western United States it refers to a boggy depression in a generally level stretch of country, and as a local word in New England it signifies an interval (intervale) or hollow, an umbrageous spot—the haunt of woodcock and other wild folk. *Valley* has replaced the older 'vale,' which now is found only in the poets' verse, and 'dale' has likewise suffered a decadence save in the northern countries of England. Both vale and dale, however, survive as the terminations of many place-names in England and the United States. *Valleys* seems to be equivalent to the lowland along a river's course, while vale and dale have to do with smaller streams, or more often with woodland hollows. In the following passage there is evidently this view in the writer's mind:

The Land higher up the Rivers throughout the whole country, is generally a level Ground, with shallow Vallies, full of Streams and pleasant Springs of clear

water, having interspers'd here and there among the large Levels, some small Hills, and extensive Vales. 'Beverley's Virginia.'

In the south, and to some extent in the western states, the word 'branch' is widely used for brook. Beverley, in his account of Virginia, speaks of 'Gravelly Branches of Chrystal Streams.' *Freshet*, now synonymous with the overflow or flooding of a stream, was formerly used in the same sense as brook, as in the line of Milton above quoted. The term is said to be locally in use in Maryland to-day. Once when fishing along a small stream in southern Nova Scotia, a young lad who accompanied me remarked that it was 'most too low a freshet for good fishing.' This was a new meaning of the word to one who always had associated it with floods, but it was without doubt a survival, in a slightly altered form, of its original sense. The Anglo-Saxon *Fersc*, from which the modern English 'fresh' is derived, meant 'on the move,' and was originally applied to a 'running' or 'fresh' water. *Run*, synonymous with brook, is a survival in America of 'rine,' 'rindel' and 'runnel,' of old English dialects.—*Popular Science Monthly*.

THE IMPORTANCE OF MAPS.—Another minor educational ideal is that all books involving movement from one geographical locality to another should have sketch maps attached to them. This principle applies especially to works of fiction, which reach a far wider public than is the case with serious books. When we re-read the Waverley Novels after reaching maturity, and with a knowledge of the positions and surroundings of the localities dealt with, we cannot avoid regret that our childish interest in each of them was not quickened and our knowledge insensibly increased by a simple sketch map on the frontispiece. This stimulating power of pictorial representation is perhaps most clearly demonstrated by a case in which the map was as imaginary as the text. How much of the interest of *Treasure Island* would have been lost but for the immortal map with which Robert Louis Stevenson enriched it! Stevenson, indeed, was deeply imbued with the geographical spirit, and in several books—I can particularly recall *Kidnapped*—produced real maps which greatly assist the young reader. Half a century ago, even history—ancient, mediæval and modern—was read in the best schools without any reference to maps, with the result that most of us had to endure the loss of time in re-reading, when grown up, a mass of works which we had literally, but not geographically, mastered in our youth.—*Scottish Geographical Magazine*.

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